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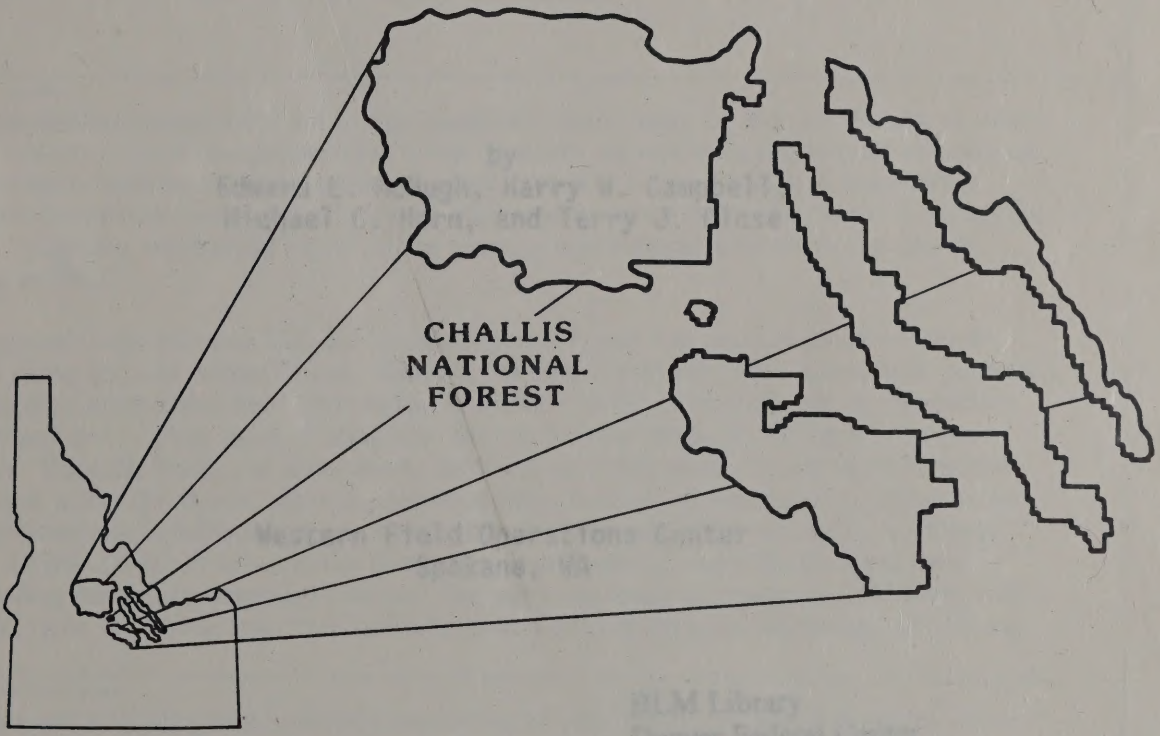
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MINERAL RESOURCE APPRAISAL OF THE CHALLIS NATIONAL FOREST, IDAHO

by
Edward L. McHugh, Harry W. Campbell,
Michael C. Horn, and Terry J. Close

Western Field Operations Center
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The appraisal of mineral resources of the Challis National Forest, Idaho, by the U.S. Bureau of Mines, was made so that the mineral resources of the forest could be appropriately considered in land use planning. Information from this study is intended to help the U.S. Forest Service to incorporate mineral resource data into forest plans. The study was done in conjunction with the U.S. Geological Survey, which released a companion report on the geology and mineral potential of the Challis National Forest in 1989.

Mineral development activity in and near the Challis National Forest has been of great economic significance to Idaho and the United States. Since the 1860's, mines within the forest have produced mineral commodities worth more than $590 million at current (1989) commodity prices. Identified mineral resources have a gross value of about $2 billion at current prices, including 8 strategic or critical minerals. The U.S. Bureau of Mines study identified and described 723 active and inactive mineral properties within the forest. Mineral properties with identified resources were evaluated to determine their economic significance, and an assessment was made of the feasibility of mineral development. Of the 2,516,191 acres in the Challis National Forest, about 390,000 acres were classified as having mining development interest. Commercially important mineral production, mainly of molybdenum, gold, and silver from the Challis National Forest is likely for the foreseeable future.

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PREFACE

A January 1987 Interagency Agreement between the Bureau of Mines, U.S. Geological Survey, and U.S. Forest Service describes the purpose, authority, and operation for a program of forest-wide studies. The program is intended to assist the Forest Service in incorporating mineral resource data in forest plans as specified by the National Forest Management Act (1976) and Title 36, Chapter 2, Part 219, Code of Federal Regulations and to augment the Bureau's mineral resource data base so that it can analyze and make available minerals information as required by the National Materials and Minerals Policy, Research and Development Act (1980). This report is based upon available information, limited field investigations to verify or collect additional information, and contacts with mine operators active on lands administered by the Challis National Forest.

The data in this report were gathered and interpreted by the USBM personnel from Western Field Operations Center, East 360 Third Avenue, Spokane, WA 99202. The report has been edited by members of the Branch of Resource Evaluation at the field center and reviewed at the Branch of Mineral Land Assessment, Washington, DC.

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

lb	avoirdupois pound	MM	million
ft^3	cubic foot	ppb	part per billion
m^3	cubic meter	ppm	part per million
yd^3	cubic yard	%	percent
ft	foot	ton	short ton (2,000 lb)
in.	inch	stu	short ton unit (20 lb)
kg	kilogram	mi^2	square mile
lt	long ton (2,240 lb)	M	thousand
ltu	long ton unit (22.4 lb)	oz	troy ounce
m	meter	oz/ton	troy ounce per ton
mi	mile	yd	yard
mt	metric ton (2,204 lb)	$	U.S. dollar
mt/day	metric ton per day	$/mt	U.S. dollar per metric ton
mtu	metric ton unit (22.04 lb)		

CONVERSION FACTORS FOR UNITS OF MEASURE USED IN THIS REPORT

1 ft = 0.3048 m
1 lt = 2,240 lb
1 ltu = 0.01 lt
1 m = 3.2808 ft
1 mt = 1.1023 ton
1 mt = 2,204.6 lb
1 mtu = 0.01 mt
1 ppm = 0.029167 oz/ton
1 stu = 0.907 mtu
1 stu = 0.01 ton
1 ton = 0.9072 mt = 2,000 lb

CHEMICAL ABBREVIATIONS USED IN THIS REPORT

Sb	antimony	S	sulfur
Ba	barium	Te	tellurium
Be	beryllium	Ti	titanium
Cd	cadmium	Th	thorium
Co	cobalt	U	uranium
Cu	copper	V	vanadium
F	fluorine	W	tungsten
Au	gold	Zn	zinc
Fe	iron	CaF_2	calcium fluoride
Pb	lead	MoS_2	molybdenum disulfide
Mn	manganese	REE	rare earth elements
Hg	mercury	SiO_2	silicon dioxide
Mo	molybdenum	ThO_2	thorium oxide
Ni	nickel	WO_3	tungsten trioxide
Ag	silver	U_3O_8	uranium oxide

MINERAL RESOURCE APPRAISAL OF THE CHALLIS NATIONAL FOREST, IDAHO

by Edward L. McHugh, Harry W. Campbell,
Michael C. Horn, and Terry J. Close

SUMMARY

Mining was the impetus for the opening of much of central Idaho to settlement. As early as 1862, prospectors were searching the valleys of the Salmon River for gold. The discovery of gold placers in Stanley Basin in that year led to a tradition of mining that persists to the present day. Since 1864, mines on lands administered by the Challis National Forest have produced precious and base metals, molybdenum, tungsten, and other mineral commodities that would have a value of more than $590 million at current commodity prices. Early activity centered on the gold-bearing placer deposits of the Yankee Fork and Loon Creek mining districts. As those easily mined deposits were depleted, attention shifted to gold and silver-bearing lode deposits in the vicinity of Bonanza and Custer along the Yankee Fork. Since that time, mining has expanded throughout the forest and the surrounding region. Different commodities became more significant as economic conditions evolved and critical shortages were recognized. Copper, lead, zinc, and tungsten were found on the Challis National Forest and mined during the years of World War I and World War II. Uranium became important in the late 1950's and again in the 1970's. The search for molybdenum in the 1970's resulted in the discovery and eventual development of the major deposit in the forest, the Cyprus-Thompson Creek mine.

Mining activity has been documented at 723 sites within the Challis forest. These sites range from major, past or present producers to individual prospect pits. At least 155 mines within the forest have been producers. Mines in the Yankee Fork Ranger District have been the most productive, with a mineral production value (at average 1989 prices) of about $423 million, mainly in molybdenum from the Cyprus-Thompson Creek mine and followed by gold and silver from the Yankee Fork mining district. Lost River Ranger District mines produced metals having a value of $142 million at current prices, primarily copper from the Empire mine but with substantial amounts of lead, gold, and silver. Tungsten from the Ima mine and secondarily silver from the Bayhorse mining district contributed most to the production of the Challis Ranger District, which totalled $21 million in value. Mines in the Middle Fork Ranger District produced metals, mostly lead and zinc, valued at $2.9 million.

Mineral resources have been identified on the Challis National Forest at 47 sites. These resources have a gross value of $2.0 billion at current commodity prices. By far the most valuable resources are at the Cyprus-Thompson Creek mine where molybdenum reserves (233 million

tons at 0.11 percent MoS_2) are worth $1 billion. These reserves will likely keep the mine productive into the next century. Although only partly on lands administered by the Challis National Forest, monitoring development of the deposit was the major activity of the forest's mineral staff for several years and continues to be of vital concern because of its economic impact on the entire region. Identified fluorspar resources at the Pacific mine and gold and silver resources at the Sunbeam mine and other deposits along the Yankee Fork bring the gross value of total identified resources in the Yankee Fork Ranger District to $1.6 billion. Plans to mine a 3.3 million ton stockwork gold-silver (0.077 oz/ton gold and 0.45 oz/ton silver) deposit at the Sunbeam mine have been delayed until environmental issues can be resolved. The value of the gold and silver resources in the district is made more significant by the presence of U.S. Antimony Corp.'s gravity-flotation-leach mill at Preachers Cove along the Yankee Fork Salmon River. The mill has allowed the development of several small, high-grade mines that otherwise would have had to financially support the building of individual milling facilities.

Zinc, copper, lead, and silver resources with a gross value of $310 million have been identified at 20 sites in the Lost River Ranger District. The most significant resources are at the Phi Kappa mine in the Alta mining district, Pioneer Mountains. This 1.655-million-ton stratabound deposit contains 3.48 percent zinc, 3.35 percent lead, 0.08 percent copper, and 3.2 oz/ton silver; four other deposits in the Alta district contain more than 100,000 tons in identified resource that have similar grades. Copper resources are primarily at the Empire mine in the Alder Creek mining district near Mackay, ID, where a 3.5-million-ton resource with 0.65 percent copper has been identified. Zinc, lead, copper, and silver resources have also been identified at six deposits in the southern Lemhi Range, east of Mackay. About 1.7 million tons of low-grade tungsten resources have been identified in the Wildhorse Creek area of the Pioneer Mountains.

Four sites in the Challis Ranger District contain identified resources with a gross value of $48 million. Fluorspar resources (about 180,000 tons) at three deposits in the Garden Creek area comprise the greatest value, although the high-bulk nature of fluorspar makes mining and marketing especially difficult. Tungsten, silver, and base-metal resources (350,000 tons with 1.9 oz/ton silver, 0.5 percent WO_3, 0.19 percent copper, 0.22 percent lead, and 0.2 percent zinc) at the Ima mine in the Lemhi Range have a gross value of about $16 million.

Identified resources at 10 sites in the Middle Fork Ranger District have a gross value of $44 million, mainly in gold and silver at the Cougar, Franklin D., and Lucky Ladd mines in the Pistol Creek area. Zinc, lead, and additional silver resources are at three deposits in the Seafoam and Sheep Mountain mining districts. A 178,000 ton resource at the Springfield Scheelite mine contains 0.27 percent WO_3.

INTRODUCTION

The Challis National Forest administers 2,516,191 acres of Federal land in central Idaho (fig. 1). Parts of six counties are included in the forest: Blaine, Butte, Clark, Custer, Lemhi, and Valley. Lands in State and private ownership within the nominal boundaries of the forest cover 17,894 acres. This report describes mining activity and mineral resources on lands administered by the Challis National Forest which include parts of the Boise, Salmon, and Sawtooth National Forests. Conversely, Challis lands managed by the Sawtooth National Forest and the Sawtooth National Recreation Area are not included here. The Forest Supervisor's headquarters is in Challis, ID. The forest is divided into four ranger districts: the Challis and Middle Fork Ranger District offices are in Challis, the Lost River Ranger District office is in Mackay, ID; and the Yankee Fork Ranger District office is 6 mi west of Clayton, ID. The forest is also partitioned into 25 management areas. See plates 1 and 2.

Primary access to the forest is provided by U.S. Highway 93 through Arco, Mackay, and Challis (fig. 1). Idaho State Highways 21 and 75 connect the forest to other parts of Idaho to the south and southwest. Secondary roads through mountainous terrain connect the forest to U.S. Highway 95 through Cascade and McCall. The Frank Church-River of No Return Wilderness and the canyons of the Salmon River extend across the northwest part of the forest, limiting access from the north.

In January 1987, the U.S. Bureau of Mines (USBM) formalized an agreement with the U.S. Forest Service (USFS) and U.S. Geological Survey (USGS) to conduct a cooperative program of forest-level mineral resource surveys on lands of the National Forest System. The purpose of the surveys is to provide the minerals data necessary to support effective land use planning and improved resource decision making. USBM responsibility is to (1) inventory historic and current mineral and energy activity, (2) appraise both identified resources and those undiscovered resources for which a statistical quantitative estimate has been made, and (3) estimate the economic significance of the resources and their feasibility for development. The detailed information in this report forms the basis for an executive summary of minerals on the forest by McHugh and others (1991). The USGS compiles and interprets information on geologic environments of mineral deposits and assesses favorability for the occurrence of undiscovered mineral and energy resources. Geology and mineral potential of the Challis National Forest were described by Worl and others (1989).

Present Investigation

The USBM mineral survey of the Challis National Forest began in December 1986. The focus of this study was to locate significant deposits in the forest, determine the quantity and quality of minerals in these deposits, and evaluate the likelihood of their future development. Field work in 1987 and 1988 was intended to fill specific data gaps where either significant mineralization was known or inferred or where basic information needed to be gathered or verified.

The starting point of the study was MILS (Mineral Industry Location System), a comprehensive USBM database that provides locations and related information on mineral industry sites throughout the world. This was supplemented by data from mining property owners and operators and the minerals staff of the Challis National Forest. A total of 723 mineral properties are described in this report. They range from small prospects with no apparent mineralization to large mines with millions of dollars in past mineral production. Some properties include sites that were individually described in previous reports but are grouped here to provide a comprehensive view of a deposit or mineralized zone. Other properties have been subdivided from previous groupings to clarify geologic settings, deposit types, or levels of activity. The mines and prospects tables of appendix A comprise the database from which nearly all the conclusions of this report were derived. The 25 areas of development interest shown on plates 1 and 2, identify parts of the forest where mining activity may affect forest resource planning. Increased metal prices and improved market conditions, for both gold and base metals, have accelerated mineral activity in the Challis National Forest in recent years. Several inactive mines have reopened, some major mining projects are in the permitting stage, and many mineral exploration efforts are underway. This report reflects the status of minerals in the forest as of early 1989.

Previous studies

This appraisal is based predominately on information available from the published geologic and mining literature; reports of the Idaho Bureau of Mines and Geology, USGS, and USBM were the primary information sources for this report. Unpublished material from USBM and USFS files, and private company data were used to supplement published information. References are cited to give credit for data or concepts, and to indicate sources of information; however, references have been kept to a minimum to avoid excessive interference with continuity of the text. More than 1,250 published and unpublished reports were consulted in the preparation of this study, those cited are listed at the end of this report. Reports of special note include the mineral resource potential and geology studies of Worl and others (1989) and Fisher and Johnson (1987). USBM mineral studies of proposed wilderness areas by Weldin and others (1973), Tuchek and Ridenour (1981), Johnson (1983), Ridenour (1985), Capstick and others (1987), Cather and Rains (1988), and Kuizon and Lipton (1989) provided much of the detailed information on mines and prospects included here.

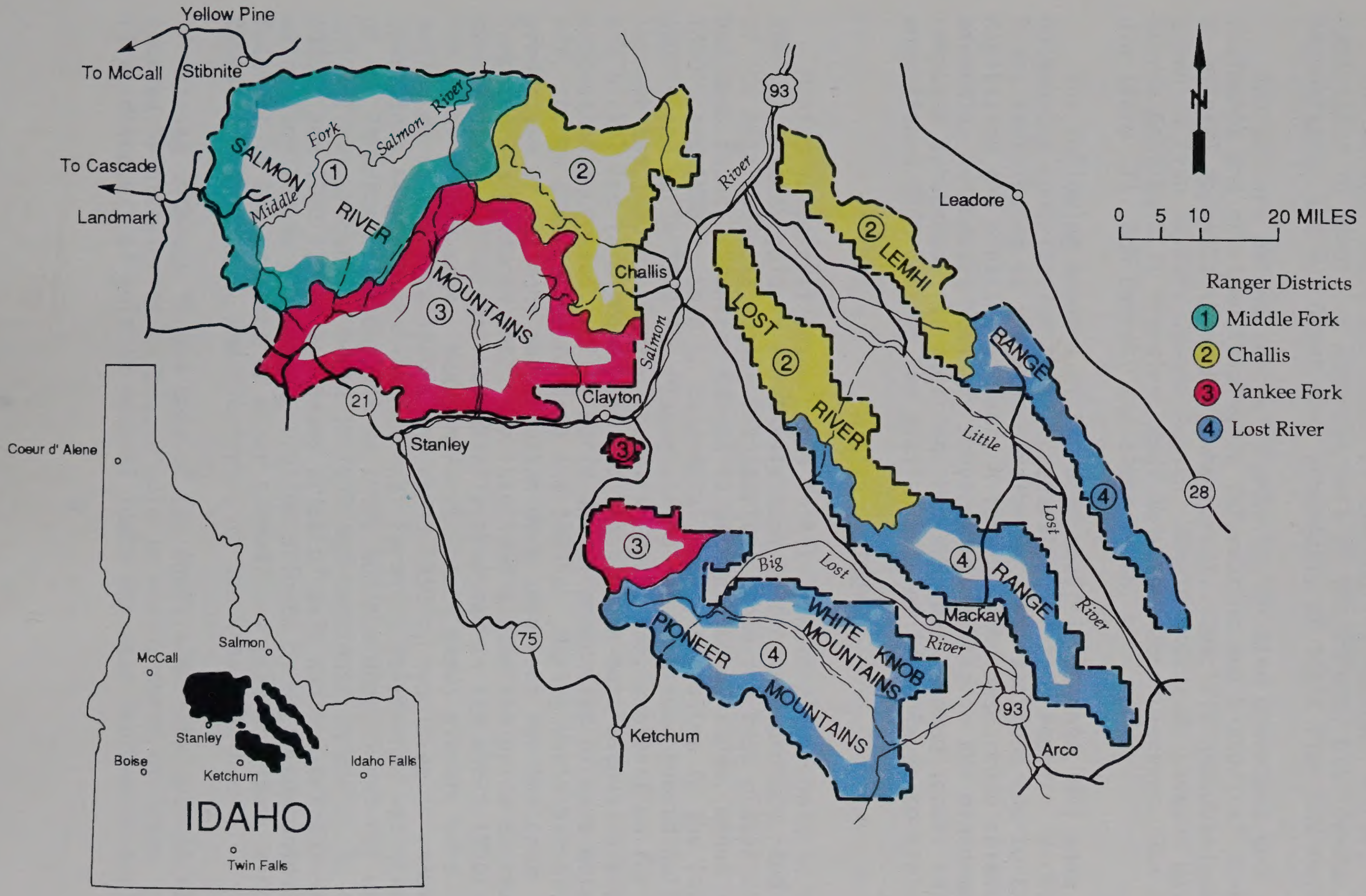
Yellow Pine
To McCall
Stibnite
To Cascade
Landmark
SALMON RIVER MOUNTAINS
Middle Fork Salmon River
①
②
③
④
Challis
Clayton
Stanley
Salmon
River
93
21
75
28
Leadore
LEMHI RANGE
LOST RIVER RANGE
Little Lost River
Big Lost River
WHITE KNOB MOUNTAINS
PIONEER MOUNTAINS
Mackay
Arco
Ketchum
N
0 5 10 20 MILES
Ranger Districts
① Middle Fork
② Challis
③ Yankee Fork
④ Lost River
Coeur d' Alene
McCall
Salmon
Stanley
Boise
Ketchum
Idaho Falls
IDAHO
Twin Falls

FIGURE 1.-Lands administered by the Challis National Forest

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The authors extend special thanks to the mine operators and claimants who provided invaluable information and historical perspective on mineral deposits throughout the forest. Specific acknowledgement is given to Ivan Taylor, Joseph Ausich, Donald Anderson, Leonard Wall, George Castle, Bill Yearsley, Andy Anderson, John Lawrence, Dan Yanke, Jim Ivers III, Bob Barret, and Elmer Ogren.

The following members of the USBM staff in Spokane, WA, made a noteworthy contribution to the preparation of this report: Richard Rains contributed to the mine development cost sections and to the digitizing and plotting of maps, Mitchell Linne researched saleable minerals, and Howard McKinney provided his skills in the management of computer databases. In addition, Paul Hyndman granted access to his unpublished USBM data on the availability of Idaho lands to mining.

MINING HISTORY

Mining in central Idaho began initially with placer gold in the 1860's. Placer gold is relatively easy to find and produce, and because of its high value is easily transported. When the best placer deposits had been found, attention turned to precious-metal lodes, mined in the 1870's and 1880's, then to base-metal lodes, exploited in the late 1800's and early 1980's. Placer mining has continued sporadically through the 1980's. During the First World War, exploration for cobalt and nickel led to discovery of additional base-metal deposits and production increased. After World War I, production of base metals fell off, though some continued into the 1980's. During World War II, production of antimony and tungsten were important for the area. Tungsten was produced until the late 1950's when the price decreased dramatically. Fluorspar was briefly produced in the early 1950's from the Meyer's Cove area. Heavy mineral (black sand) placers were evaluated in the late 1940's and early 1950's, resulting in commercial operations near the Challis National Forest. Molybdenum was discovered at the Thompson Creek deposit in 1967, but the deposit was not developed until 1980; production began in 1983 and continues in 1990. In the 1970's and 1980's, the increased price of gold and new methods of extraction led to renewed exploration efforts by major companies. Interest in the presence of other commodities (silver, lead, zinc, tungsten, molybdenum, and fluorspar) in the area continues.

Mining interest in the area of the Challis National Forest was spurred by discoveries of placer gold in nearby parts of Idaho. The first discovery of gold in central Idaho was near Orofino as early as

1857 (Staley, 1946, p. 5; Lorain and Metzger, 1938, p. 6-7). It is uncertain when the initial discovery of placer gold was made, but exploration was underway on the forest by the mid-1860's; placer gold discoveries were made in the Yankee Fork and Jordan Creek areas about that time. A gold rush on the upper Salmon River was sparked by Nathan Smith's placer discoveries on Loon Creek, a tributary of the Salmon, in August 1869 (Ross, 1963). The mines of south-central Idaho produced some $2 to $5 million in the early years of operation, how much of this came from mines on the Challis Forest is not known. A significant but unknown amount of placer production took place in the late 1860's and 1870's, in spite of high costs and extreme hardships. Soon after, however, production from placer deposits fell off as the major deposits were depleted.

Prospecting began in the area that was to become the Bayhorse mining district in the early 1860's at the Pacific, Ramshorn, and Skylark mines. Lode mining claims were filed in 1866, in the Garden Creek area, on extensions of mineralized zones from the Bayhorse mining district. Development of lode deposits along the Yankee Fork of the Salmon River began with the location of the Charles Dickens mine in 1875, and the General Custer mine in 1876. Lode mining proceeded to other oxidized gold-silver deposits through the remainder of the 1870's.

Development of the silver-lead mines of the Bayhorse mining district began in the early 1880's. Copper deposits near Mackay, ID, and in the Spring Mountain mining district, Lemhi Range, were first actively developed about 1884, although most of the production came later.

The Yankee Fork district probably produced more than $12 million in gold and silver prior to 1905, mostly from the General Custer mine. The Lost Packer mine began production when a smelter was built at the site in 1904. Matte from the smelter was hauled 110 mi by road to the railhead at Mackay, ID. Much of the mining was in 1907, 1908, 1911, and 1914; yield was about $500,000 in gold, silver and copper. The Empire mine, near Mackay, produced about $4 million in copper prior to World War I and was responsible for a sharp 1913 peak in mine production from Custer County.

The Dome mining district, in Butte County, became active about 1905. The principal producer was the Wilbert mine with a record of almost constant production from 1906 through 1931. Other important mines in the Dome District including the Sentinel, Ajax, and Great Western added to the production of lead, silver, copper, and zinc from the district. Another consistent producer, the Phi Kappa mine, located in the Alta mining district, Pioneer Mountains, produced gold, silver, copper, lead, and zinc intermittently from 1926 to 1981. With the incentives of World War I, production crested at the Mackay copper mines in 1917 but quickly declined after the war. Use of alloy steels in munitions led to prospecting for cobalt and nickel in western Lemhi County.

Tungsten was discovered at the Ima mine, in the Blue Wing mining district, Lemhi County, in 1903. Mining was attempted in 1911 but little was accomplished until 1934; significant production began in 1936. During World War II, tungsten mining continued at the Ima mine, and first antimony, then tungsten were mined at the Yellow Pine mine (5 mi northwest of the Challis Forest). The Parker Mountain district was discovered as a result of the search for cobalt and fluorspar. After World War II, mining continued at the Ima mine until June 1957; tungsten prices had fallen sharply, from $60/stu in 1955 to $18.50/stu in 1958. The Wildhorse mine, in the Pioneer Mountains, was discovered in August 1953, and produced tungsten through 1956.

Fluorspar was found at Meyer's Cove along the northern edge of the forest in 1941, but the district did not produce until 1951; the mill burned and activity ceased in 1953. More than 12,000 tons of fluorspar were produced.

The USBM investigated heavy mineral (black sand) placer deposits in and near the forest between 1948 and 1955. The investigation resulted in commercial operations near Cascade, ID, and in Bear Valley, both west of the Challis Forest, between 1950 and 1960. Radioactive and rare earth-bearing minerals were recovered as well as byproduct magnetite ilmenite, zircon, and garnet.

Claims for low-grade uranium ore northeast of Stanley were first staked in 1955; 2,300 tons of ore averaging 0.25 percent U_3O_8 were shipped in 1957 and 1958. In 1959, 3,374 tons of ore valued at $30,000 were shipped, but activity declined in 1960.

The Thompson Creek open pit molybdenum mine began production in 1983; the value of molybdenum produced through 1988 exceeds that for any other commodity mined on the forest. When mining began, estimated reserves represented a 15-22 year mine life at the design capacity.

The continuing high price of gold in the 1980's has stimulated exploration activities and efforts to delineate deposits by U.S. Antimony Corp., Lucky Custer Gold, Inc., Sunbeam Mining Corp. and others. Drilling programs or underground drifting, mostly for gold, silver, lead, zinc, and fluorspar, have been carried out in recent years on the following properties: Greyhound, Seafoam, Parker Mountain, Keystone, Ramshorn, Skylark, Pacific, Butte Antelope, Lead Belt, Great Western, Copper Basin, and Ima mines, and in the Estes Mountain, Bachelor Mountain, Garden Creek, and North Fork of the Big Lost River areas.

Through 1988, the U.S. Antimony mill at Preacher's Cove processed ore from the General Custer-Lucky Boy pit and the Lost Packer mine. Ore was also hauled to the Preacher's Cove mill from the Yellow Jacket mine, just north of the Challis forest. Permitting and legal challenges have postponed open pit mining at the Sunbeam mine since environmental reports were issued in 1984; exploration continued in 1989 for extensions of known ore zones. Three placer gold mines were operating in the Yankee Fork Ranger District on Kelly Creek, Joes Gulch, and Jordan Creek.

MINING CLAIMS

U.S. Bureau of Land Management (BLM) mining claim recordation data (as of October 19, 1988) were used to generate the mining claim density plots shown in figure 2. The plots include all claims filed with BLM since 1976, when FLPMA (Federal Land Policy and Management Act) required recording of mining claims. Annual assessments have not been filed on some of the claims; these are considered to be abandoned. Although most mining claims are concentrated in areas of past mining activity, some claims, such as those near Copper Mountain about 16 mi northwest of Stanley, have had no previous mention in the mining or geologic literature. Most known mining sites are covered by recent claims.

MINERAL DEPOSITS AND IDENTIFIED RESOURCES

Since the 1860's, mines within the Challis National Forest have produced gold, silver, copper, lead, zinc, molybdenum, tungsten, fluorspar, uranium, antimony, iron ore, manganese, and stone worth more than $590 million at average 1989 commodity prices. Identified resources in the forest have a gross in-place value of about $2 billion at current prices. Resources for eight strategic or critical commodities[1] have been identified in the Challis National Forest. Values for past production and identified resources shown here and elsewhere in the report are at average 1989 commodity prices (See appendix C.), unless otherwise indicated. These values are intended to provide a means of comparing the importance of different commodities and mineralized areas with each other and with other resources in the forest. The values given for past production are the best available approximations from all information sources. In many cases substantial production took place before accurate records were kept, for example, gold from the Yankee Fork area mined before 1890. The precision suggested in the following tables reflects the authors' confidence in the validity of each estimate: some totals required severe rounding. Totals are given by commodity to avoid revealing proprietary information for an individual property. Non-proprietary production information is in the ranger district discussions that follow, or is in individual deposit descriptions in the tables of appendix A.

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[1] Copper, fluorspar, lead, manganese, molybdenum, silver, tungsten, zinc.

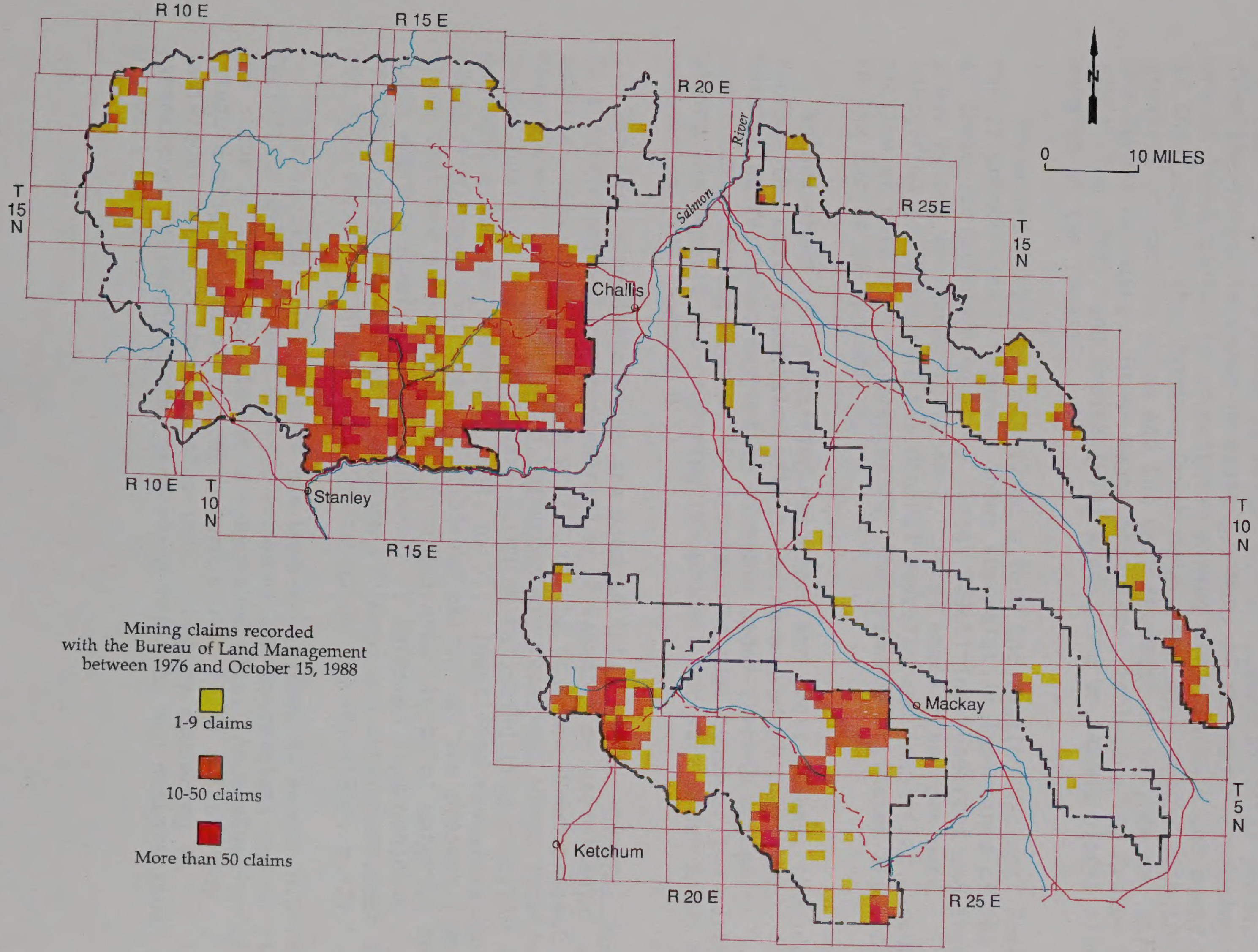

R 10 E
R 15 E
R 20 E
R 25 E
T 15 N
T 10 N
T 5 N
N
0 10 MILES
Salmon River
Challis
Stanley
Ketchum
Mackay
Mining claims recorded with the Bureau of Land Management between 1976 and October 15, 1988
1-9 claims
10-50 claims
More than 50 claims

FIGURE 2.-Mining claim densities in the Challis National Forest

The relative values of the main commodities produced in the Challis National Forest are shown in figure 3. A summary of total production from the forest is shown in table 1. Many of the major producing mines are at least partially on patented mining claims within the boundaries of the forest. The Thompson Creek molybdenum mine (502), with the greatest production value and the only producer of molybdenum, straddles the forest boundary. Other major producers, including the Kraken Hill (251), Ima (268), and Empire (576) mines, are on patent blocks along the margins of the forest.

Resources have been identified within the Challis National Forest for 11 commodities. Figure 3 shows the relative importance of the value of these identified resources. Total identified resources and their gross values are shown in table 2. Sites where resources were identified are listed in the Mineral Deposits and Identified Resources section of this report; sources for the resource estimates are included in the tables of appendix A.

Values shown for identified resources are gross values; they do not include the costs associated with bringing a product to market. Identified resources may not be mineable under current economic conditions. Mining feasibility assessments must consider the costs of mining the deposit and preparing the product for sale under known market conditions (See appendix B.).

The following definitions are used in this report: mineral deposit is a sufficiently large concentration of valuable or useful metal or material that extraction at a profit may be feasible under present or future conditions; identified resources are resources whose location, grade, quality, and quantity are known or estimated from specific geologic evidence (Goudarzi, 1984, p. 5). Identified resources may range from those that are profitable to extract at the present time to those that are subeconomic, and from measured blocks of material to those where possibly valuable material is inferred from geologic evidence. For additional discussion of these and other pertinent terms see U.S. Bureau of Mines and U.S. Geological Survey (1980, p. 1).

This section of the report has been subdivided by ranger district to facilitate use by Forest Service managers and technicians and to limit the scope of the discussion to a manageable size. An evaluation of saleable mineral commodities on a forest-wide level follows the individual ranger district discussions. Numbers appearing in parentheses following mining properties refer to map numbers shown on plates 1 and 2.

Table 1.--Summary of mineral production from the Challis National Forest

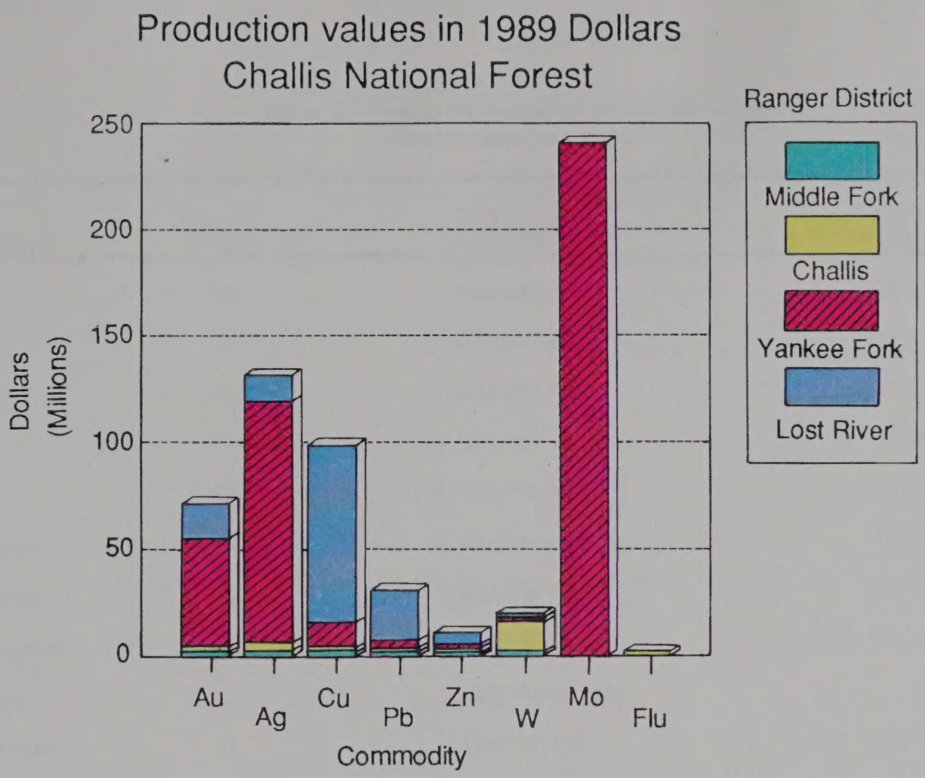
Commodity	No. of Producers	Total Quantities	Value[1,2,3] ($1,000)
Gold	84	180,000 oz	69,300
Silver	99	24,000,000 oz	133,000
Copper	59	72,500,000 lb	95,700
Lead	72	70,500,000 lb	28,200
Zinc	28	8,730,000 lb	7,200
Tungsten	7	315,000 stu WO_3	16,000
Fluorspar	1	720 tons	120[2]
Molybdenum	1	52,000,000 lb	241,000
Uranium	5	32,600 lb U_3O_8	340[3]
Manganese	1	14,300 ltu	41
Iron ore	2	696,000 ltu	400
Antimony	1	3,510 lb	3
		TOTAL[4]	591,000

[1] Value at 1989 average commodity prices from USBM (1990) Mineral Commodity Summaries: gold $385/oz; silver $5.55/oz; copper $1.32/lb; lead $0.40/lb; zinc $0.83/lb; tungsten $56/mtu contained WO_3 ($50.80/stu contained WO^3); molybdenum $3.65/lb, manganese $2.85/ltu, iron ore $0.58-$0.74/ltu (pelletized), antimony $0.99/lb.

[2] Value at January 1990 commodity price from "Industrial Minerals" (1990, p. 66): fluorspar $173/ton (acid grade, more than 97% CaF_2).

[3] Value at 1989 commodity prices from "Engineering and Mining Journal" (White, 1990 p. 59): uranium $10.38/lb U_3O_8 (range $11.75 to $9.00).

[4] Data may not add to total due to independent rounding.



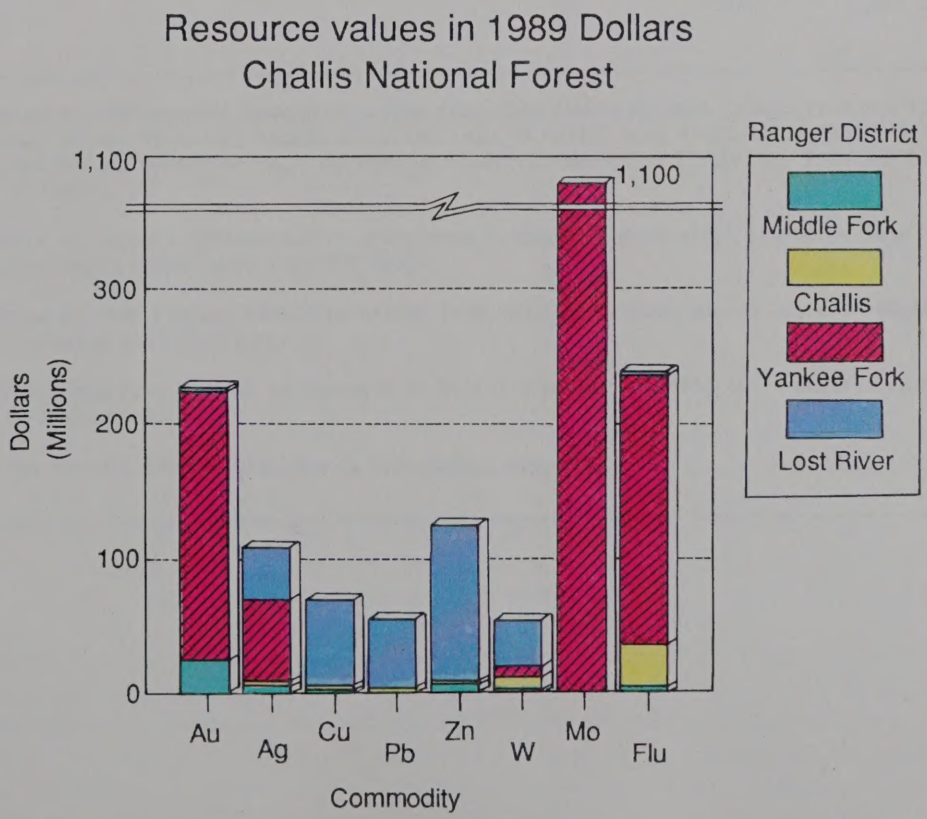


FIGURE 3.-Value of mineral production and identified resources in the Challis National Forest

Table 2.--Identified mineral resources in the Challis National Forest

Commodity	No. of Properties	Total Quantities	Value[1] ($1,000)
Gold	16	580,000 oz	220,000
Silver	22	19,000,000 oz	110,000
Copper	8	51,000,000 lb	67,000
Lead	17	130,000,000 lb	52,000
Zinc	12	150,000,000 lb	120,000
Tungsten	5	1,100,000 stu WO$_3$	56,000
Fluorspar	6	1,400,000 tons	240,000[2]
Molybdenum	2	310,000,000 lb	1,100,000
Uranium	2	20,000 lb U$_3$O$_8$	210[3]
Manganese	1	360,000 ltu	1,000
Iron ore	2	500,000,000 ltu	[4]
		TOTAL[5]	2,000,000

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[1] Value at 1989 average commodity prices from USBM (1990) Mineral Commodity Summaries: gold $385/oz, silver $5.55/oz, copper $1.32/lb, lead $0.40/lb, zinc $0.83/lb; tungsten $56/mtu contained WO$_3$ ($50.80/stu contained WO$_3$), molybdenum $3.65/lb, manganese $2.85/ltu, iron ore $0.58-$0.74/ltu (pelletized).

[2] Value at January 1990 commodity price from "Industrial Minerals," (1990, p. 66): fluorspar $173/ton (acid grade, more than 97% CaF$_2$).

[3] Value at 1989 average commodity prices from "Engineering and Mining Journal" (White, 1990, p. 59): uranium $10.38/lb U$_3O_8$.

[4] These resources may not be amenable to pelletizing for the iron ore industry; value calculations may be misleading.

[5] Data may not add to total due to independent rounding.

Middle Fork Ranger District

The Middle Fork Ranger District is in the rugged and remote northwestern part of the Challis National Forest. Topography in the region is controlled by the Middle Fork Salmon River and its tributaries, which have carved deep canyons through the Salmon River Mountains. The 236 mines and prospects identified in the Middle Fork Ranger District are shown on plate 1; summary descriptions of each site are presented in appendix A, table A-1.

Primary access to the southern part of the district is via gravel road over Vanity Summit from Idaho State Highway 21 and by gravel road over Loon Creek Summit from U.S. Highway 93. Back country roads from Stibnite and Landmark provide access to the northwestern part of the district. Travel in the Frank Church-River of No Return Wilderness, which dominates the Middle Fork Ranger district, is by trails and streams. Heavy snowfall is common, often blocking main access roads over Vanity and Loon Creek Summits in November; these roads are usually reopened by June. Elevations in the district range from about 2,000 ft along the Middle Fork Salmon River, to more than 10,000 ft in the Salmon River Mountains along the southern district boundary. The nearest railroad is at Ketchum, ID, about 100 mi by road from the Seafoam Guard Station.

Principal sources of information about mines and prospects in the Middle Fork Ranger District include a USBM report on parts of the Frank Church-River of No Return Wilderness by Ridenour (1985) and a joint USBM/USGS report on the former Idaho Primitive Area and vicinity by Cater and others (1973). A USGS study of the geology and mineral resources of the Challis 1° by 2° quadrangle, which encompasses the entire Middle Fork Ranger district, were reported by Fisher and Johnson (1987). An assessment of mineral resource potential of the Challis National Forest was reported by Worl and others (1989).

Geologic Setting

Rocks hosting mineral deposits in the Middle Fork Ranger District range in age from Precambrian (older than 570 million years) to Holocene (less than 10,000 years). Most metal deposits in the district are related to the intrusion of igneous rocks of the Cretaceous-age Idaho Batholith or Tertiary-age plutons. These intrusions introduced metals or provided concentration mechanisms which produced various metal deposits, including skarns, veins, pegmatites, disseminations, stockworks, and replacement bodies (Worl and others, 1989). The Tertiary-age trans-Challis fault system, which is a series of northeast-trending, high-angle faults and related structures, has tended to localize mineralization in the Middle Fork district (Fisher and Johnson, 1987). The extensive trans-Challis fault system stretches discontinuously across Idaho into Montana, and hosts many mineral deposits along its great length. The Middle Fork Ranger District is mainly underlain by Cretaceous granite and granodiorite of the Idaho batholith (Atlanta Lobe) which have been intruded by the northeast-trending Tertiary plutons and dikes of mostly dacitic-to-rhyolitic composition (Kiilsgaard and Lewis, 1985). Kiilsgaard and Bennett (1985) conclude that most mineral deposits in the Atlanta lobe of the Idaho batholith are related to Tertiary intrusive rocks and controlled by regional faults. Mineral deposits of the Greyhound and Seafoam mining districts have quartz-filled fissure veins and lenticular cavities containing silver-lead-zinc minerals. Host rocks are Cretaceous granodiorite and quartz monzonite intruded by Tertiary rhyolite and dacite dikes; the rocks are silicified and sericitized in and near the lodes (Olson, 1968). Within the past million years, weathering and erosion related to increased fluvial activity during glaciation have concentrated gold and other heavy minerals into placer deposits along stream channels. See Worl and others (1989) for a detailed discussion of geology and mineral deposit models of the Middle Fork Ranger District.

Mining Activity

Two mining districts, Seafoam and Sheep Mountain, are in the Middle Fork Ranger District (fig. 4), and two others, Yellow Pine and Thunder Mountain, have a small part of their southern extremities in the Middle Fork district. The Loon Creek and Parker Mountain mining districts adjoin the ranger district boundary on the east. The principal commodities of interest have been gold and silver, but lead, tungsten, zinc, and copper have also been produced in the Middle Fork district. Early producing mines in the Middle Fork district included the Greyhound, Seafoam, Mountain King, and Hardscrabble mines; most production occurred from 1884 to 1910. Smelters at the Greyhound and Lost Packer mines processed ore, although some handsorted ore was hauled to smelters at Ketchum and Clayton (Wells, 1983, p. 119). Although sporadic mining activity has occurred for more than a century in the Middle Fork district, production has been small. The main impediment to development has been the remoteness of the area and inadequate road access. Another, recently added hindrance has been the withdrawal of large amounts of land from mineral entry through wilderness legislation. Most of the Middle Fork Ranger District is included in the Frank Church-River of No Return Wilderness. Wilderness designation has reduced mining activity because of the constraints placed on potential mining and mineral exploration ventures by the Wilderness Act (Public Law 88-577, Sept. 3, 1964) and the Central Idaho Wilderness Act (Public Law 96-312, July 23, 1980).

Several economically important mineralized areas are near the Middle Fork Ranger District. The Yellow Pine mine, 5 mi northwest of the district, was the foremost domestic source of tungsten during World War II, and was this nation's largest producer of antimony until 1952. This mine is presently (1989) producing gold from a disseminated deposit.

The Hermes mine, about 2 mi east of the Yellow Pine mine, was in some years the second largest mercury producer in the United States. The Blackbird cobalt mine, about 11 mi northeast of the ranger district boundary, has one of the most significant cobalt deposits in the United States. The Thunder Mountain mining district, which in 1902 was the scene of one of the last "gold rushes" in the Western States, is situated on the northern border of the Middle Fork district.

Between 1880 and 1988, 17 mines in the Middle Fork Ranger District have produced gold, silver, copper, lead, zinc, and tungsten with a total value of $2.9 million at current (1988 average) commodity prices (table 3). About 15 other mines in the district are known to have produced small, but unknown quantities of ore. Most of the recorded production was from early precious metal mining, but significant amounts of base metals were also mined. Mines with significant production within the ranger district are the Mountain King (172), Sheep Mountain district; Lucky Ladd (122), Cougar (119), and Springfield Scheelite (41) mines, Pistol Creek area; and Seafoam (193) and Greyhound (162) mines, Seafoam district.

Identified Resources

Resources have been identified at 10 mining properties in the ranger district. These mineral resources include gold, silver, copper, lead, zinc, tungsten, fluorspar, and uranium with an estimated gross value of $44 million at current (1989 average) prices (tables 4 and 5). In addition, substantial but unquantified silver-lead-zinc resources are at the Greyhound mine.

Areas of Development Interest

The discussion of the mines and prospects in the Middle Fork Ranger District, is divided into six areas of development interest (two mining districts, and four other areas) (fig. 4). All of the Middle Fork Ranger District is in the Frank Church-River of No Return Wilderness, except for exclusions of most of the Seafoam and Sheep Mountain mining districts, and road corridors in the Pistol Creek and Indian Creek areas (plate 1). Expected mining activity in the Middle Fork Ranger District will be in the aforementioned wilderness excluded areas. Mineralized areas within the Frank Church-River of No Return Wilderness are discussed, even though wilderness designation will preclude mineral development, because these areas would undoubtedly attract mining interest if mineral entry restrictions were removed.

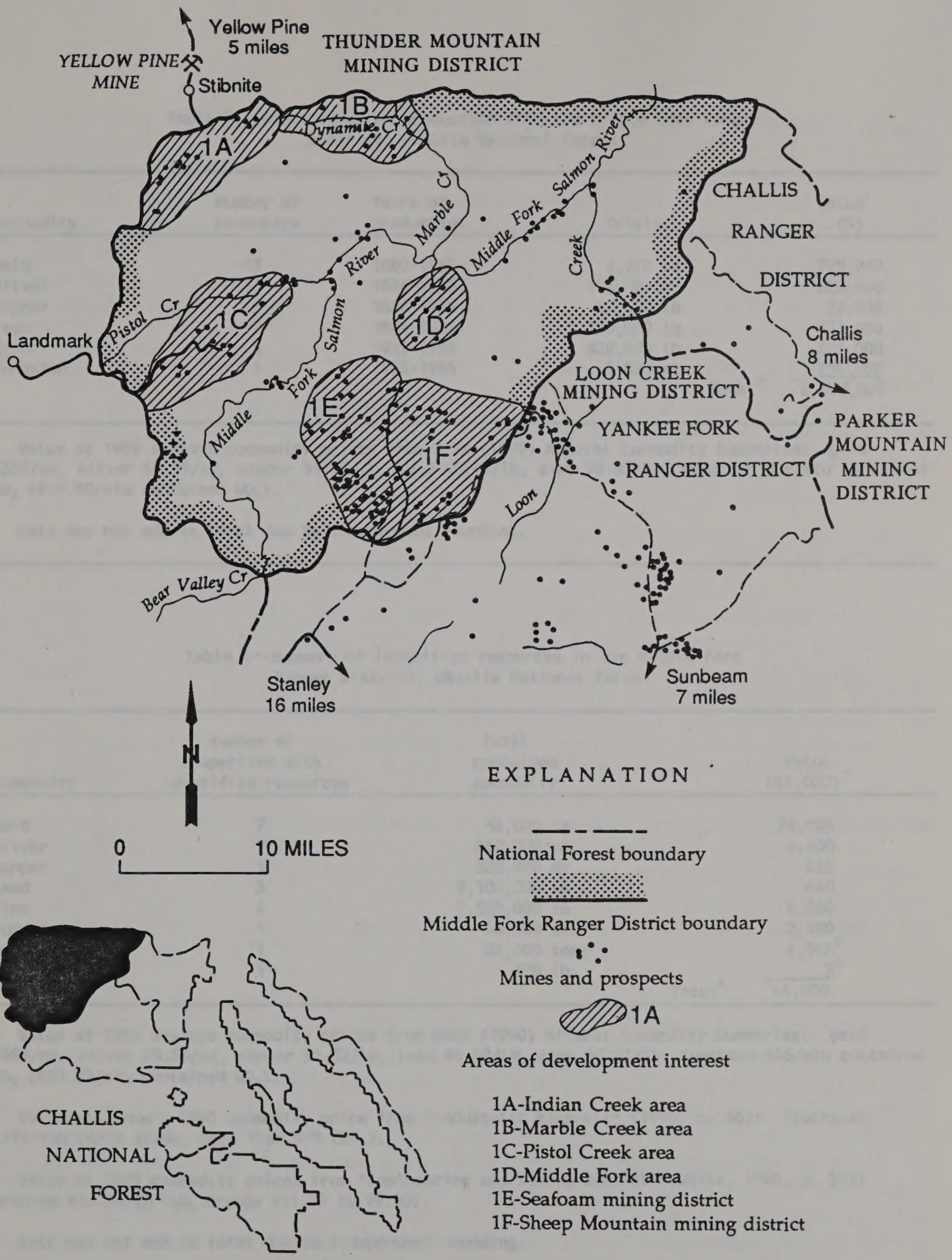
Yellow Pine 5 miles
YELLOW PINE MINE
Stibnite
THUNDER MOUNTAIN MINING DISTRICT
1A
1B
Dynamite Cr
Marble Cr
Middle Fork Salmon River
Creek
CHALLIS RANGER DISTRICT
Challis 8 miles
Pistol Cr
1C
River
Salmon
Fork
Middle
1D
Landmark
LOON CREEK MINING DISTRICT
YANKEE FORK RANGER DISTRICT
PARKER MOUNTAIN MINING DISTRICT
1E
1F
Loon
Bear Valley Cr
Stanley 16 miles
Sunbeam 7 miles
N
0
10 MILES
EXPLANATION
National Forest boundary
Middle Fork Ranger District boundary
Mines and prospects
1A
Areas of development interest
1A-Indian Creek area
1B-Marble Creek area
1C-Pistol Creek area
1D-Middle Fork area
1E-Seafoam mining district
1F-Sheep Mountain mining district
CHALLIS NATIONAL FOREST

FIGURE 4. - Areas of development interest in the Middle Fork Ranger District

Table 3.--Recorded metal production from the Middle Fork Ranger District, Challis National Forest

Commodity	Number of producers	Years of production	Totals	Value[1] ($)
Gold	13	1880-1965	2,070 oz	798,000
Silver	15	1884-1988	113,000 oz	628,000
Copper	5	1884-1988	17,400 lb	23,000
Lead	12	1884-1988	1,130,000 lb	453,000
Zinc	5	1935-1988	820,000 lb	681,000
Tungsten	1	1953-1955	5,820 stu	294,000
			Total[2]	2,877,000

[1] Value at 1989 average commodity prices from USBM (1990) Mineral Commodity Summaries: gold $385/oz, silver $5.55/oz, copper $1.32/lb, lead $0.40/lb, zinc $0.83/lb, tungsten $56/mtu contained WO_3 ($50.80/stu contained WO_3).

[2] Data may not add to total due to independent rounding.

Table 4--Summary of identified resources in the Middle Fork Ranger District, Challis National Forest

Commodity	Number of properties with identified resources	Total contained commodity	Value ($1,000)[1]
Gold	7	63,000 oz	24,000
Silver	7	860,000 oz	4,800
Copper	1	320,000 oz	420
Lead	3	2,100,000 lb	840
Zinc	4	7,800,000 lb	6,500
Tungsten	1	48,000 stu	2,400
Fluorspar	1	26,000 tons	4,500[2]
Uranium	1	320 lb	3[3]
		Total[4]	44,000

[1] Value at 1989 average commodity prices from USBM (1990) Mineral Commodity Summaries: gold $385/oz, silver $5.55/oz, copper $1.32/lb, lead $0.40/lb, zinc $0.83/lb, tungsten $56/mtu contained WO_3 ($50.80/stu contained WO_3).

[2] Value at January 1990 commodity price from "Industrial Minerals" (1990, p. 66): fluorspar $173/ton (acid grade, more than 97% CaF_2).

[3] Value at 1989 commodity prices from "Engineering and Mining Journal" (White, 1990, p. 59): uranium $10.38/lb U_3O_8 (range $11.75 to $9.00).

[4] Data may not add to total due to independent rounding.

Table 5.--Identified resources in the Middle Fork Ranger District, Challis National Forest

Map No.	Mine name	Quantity (tons)	Grade	Commodity	Unit totals
27	Sullivan Uranium prospect	800	0.02%	Uranium	320 lb
		23,000	0.1%	Lead	46,000 lb
			0.2%	Zinc	100,000 lb
			0.1 oz/ton	Silver	2,000 oz
41	Springfield Scheelite mine	178,000	0.27%	Tungsten	48,000 stu
50	Pungo Creek Fluorspar prospect	26,000	½ is acid grade	Fluorspar	26,000 tons
119	Cougar mine	5,000	0.30 oz/ton	Gold	1,500 oz
			1.10 oz/ton	Silver	5,500 oz
120	Franklin D. mine	81,000	0.59 oz/ton	Gold	50,000 oz
			4.48 oz/ton	Silver	360,000 oz
122	Lucky Ladd mine	500	1.0 oz/ton	Gold	500 oz
			7.6 oz/ton	Silver	4,000 oz
132	Joe Bump Bar placer	33,000 yd^3	0.01 oz/yd^3	Gold	330 oz
150	Black Jack mine	700	0.09 oz/ton	Gold	63 oz
			9.21 oz/ton	Silver	6,500 oz
		2,700	1.83%	Lead	100,000 lb
			3.40%	Zinc	200,000 lb
169	Bacon group	38,000	0.26 oz/ton	Gold	10,000 oz
			9.60 oz/ton	Silver	360,000 oz
			0.42%	Copper	320,000 lb
			6.61%	Zinc	5,000,000 lb
172	Mountain King mine	60,000	0.01 oz/ton	Gold	600 oz
			2.10 oz/ton	Silver	130,000 oz
			1.35%	Lead	2,000,000 lb
			2.13%	Zinc	2,500,000 lb

Indian Creek area (1)

Sixteen mines and prospects are in the Indian Creek area, mostly in the upper drainage of Indian Creek. The only known production was from the Springfield Scheelite mine, which was active from 1953-1955. The Indian Creek watershed is mainly underlain by Challis Volcanics, but Tertiary- and Cretaceous-age granitic rocks crop out along the western part of the drainage. The Springfield Scheelite tungsten deposit formed where carbonate rocks were replaced by ore minerals near the contact with the Idaho batholith. Numerous Tertiary dikes cut rocks in the western part of the area. A few test pits are visible in gravels along Indian Creek. Silicified zones in the western part of the district have been prospected by adits (now caved) and prospect pits. The largest of the silicified zones is a southern extension of the zone mined for antimony and gold at the Yellow Pine mine about 5 mi northwest of the Middle Fork Ranger District. North of Big Chief Creek, this zone consists of stockworks of finely crystalline quartz and chalcedony in fractured and, in places, mylonitic granodiorite and alaskite. South of the creek, the zone is mostly massive quartz. Molybdenite, intergrown with powellite and jarosite, form sparse patches on joints in quartz veinlets; at one of the prospect pits, the dump contained some azurite- and malachite-stained amphibole schist. Geochemical samples from soil south of Big Chief Creek contained anomalous antimony, gold, and mercury; stream sediment samples contained anomalous arsenic and copper (Cater and others, 1973, p. 42).

The Springfield Scheelite mine (41), consisting of 10 unpatented claims of the White Mare group, produced tungsten for three years ending in 1955 (Cater and others, 1973, p. 31). About 25,000 tons of colluvium containing 0.35 percent WO_3 was mined from the deposit. Massive pyrrhotite, concentrated by gravity methods at the mine site, yielded concentrates containing 5,940 stu of WO_3. The ore body beneath the colluvium is classified as a polymetallic skarn deposit (deposit type L of Worl and others, 1989) and described as a "high temperature replacement of garnet-pyroxene skarn developed from carbonate rocks included within the alaskite facies of the Idaho batholith." (U.S. Geological Survey, 1964, p. A4). After the ore-grade material was depleted, the deposit was drilled, but the underlying mineralized rock was found to be of lower grade. About 178,000 tons of material, containing an average of 0.27 percent WO_3 is estimated to remain on the property (Cater and others, 1973, p. 210). The ore-grade colluvium was possibly enriched by the leaching of more soluble non-ore components of the rock.

On the Middle Fork Salmon River at the mouth of Pungo Creek, a fluorite vein containing quartz and limonite is exposed in an opencut. This prospect was first located in the early 1900's and was prospected for gold and silver. Fluorite occurs in a vein, in small veinlets, and as disseminations in a siliceous, brecciated 5-ft-wide fault zone which cuts porphyritic diorite. A total fluorite resource of 26,000 tons is estimated, of which about half is acid grade (Cater and others, 1973, p. 355).

Two prospects have stockwork molybdenum occurrences in Tertiary granitic rocks. The stockwork was discovered by Cater and others (1973), and would doubtlessly have been thoroughly explored during the molybdenum porphyry boom of the late 1970's and early 1980's except for their location in the Idaho Primitive Area with its restrictions on mining activity.

Marble Creek area (1)

Nineteen prospects are located in the Marble Creek area. Challis Volcanics underlie the area along the lower drainage of Marble Creek and the watersheds of a few short nearby streams that drain directly into the Middle Fork Salmon River. Mining in the Thunder Mountain district, just north of the area, stimulated prospecting along Marble Creek in the late 1890's. There is no recorded mineral production from this area, but a few old placer workings are scattered along the course of Marble Creek. Vein deposits in the Marble Creek area cut Eocene granite and the overlying Challis Volcanics. Disseminated gold and silver occur in altered areas of the volcanic rocks. The vein deposits are more conspicuous, but the disseminated deposits are widespread and, because of their similarity to the Thunder Mountain deposits, have received greater attention. Three-fourths of the prospects in the Marble Creek area are disseminated deposits. At the Giant Legge prospect, a mineralized zone about 3,600 ft long and 200 ft thick, is exposed along Dynamite Creek (deposit type K of Worl and others, 1989). A sample across this altered zone assayed 0.02 oz/ton gold and 0.25 oz/ton silver (Cater and others, 1973, p. 369). The area along Dynamite Creek would be a prime exploration area for disseminated precious metal deposits were it not in the Frank Church-River of No Return Wilderness.

Ross (1934, p. 131) described veinlets of quartz and fluorite in a breccia zone about 7,000 ft east of the lower part of Marble Creek.

Pistol Creek area (1C)

The Pistol Creek area includes the drainage of Pistol Creek and a small area draining directly into the Middle Fork Salmon River. Twenty-three deposits, both placer and lode, have been worked in the Pistol Creek drainage. Along the ridge above Pistol Creek, many deposits have been prospected, and ore was shipped from the Lucky Ladd and Cougar mines. Most of the district is underlain by the Idaho batholith, but Challis Volcanics crop out along the northern edge of this area. Tertiary dikes are numerous and widespread. Along Pistol Creek Ridge, faults strike N40°-80°W and were displaced by northeast-trending cross-faults and Tertiary dike swarms (Cater and others, 1973).

The Lucky Ladd (122), Cougar (119), and Franklin D. (120) mines in the Pistol Creek Ridge area are gold-silver-lead deposits (deposit type F of Worl and others, 1989). Recovered precious and base metals came from high-grade oxidized ore in small bodies along veins at or near the surface. Resources in vein deposits of the Lucky Ladd, Franklin D., and Cougar mines and three nearby prospects contain an estimated 87,550 tons of material, with gold values ranging from 0.2 to 1.0 oz/ton gold with byproduct silver and lead (Cater and others, 1973, p. 61). Highly oxidized ore occurs in vuggy quartz veins and in finely ground to blocky, iron-oxide-stained calc-silicate rock breccia (Cater and others, 1973, p. 213). The Franklin D. mine has a quartz vein in a shear zone in granodiorite. The deposit is explored by several cuts and an adit several hundred feet long. The Cougar mine is partly in the Idaho batholith and partly in a metasedimentary xenolithic block. The Lucky Ladd consists of a small vein near a contact between alaskite that contains xenolithic blocks of Hoodoo Quartzite and alaskite that contains Yellowjacket Formation calc-silicate rocks. Mineralization was controlled by irregular northeast-trending fissures within northwest-striking faults.

Anomalous stream-sediment samples in the Pistol Creek area suggest widely dispersed low-level mineralization. The silicified rocks in the western part of the district are thought to form the distal end of the intensely mineralized zone in which the highly productive Yellow Pine mine is located (Cater and others, 1973, p. 43).

Middle Fork area (1D)

Thirty-four mines and prospects are in the Middle Fork area; mining claims were first located in the area in the 1890's. Lode prospects are scattered through the area; a small cluster of prospects is in the vicinity of Thomas Creek. Most exploration and development work has been on Scarface (Iowa) Mountain. The Little Johnny prospect (98) on the western slope of Scarface Mountain has the only recorded silver-lead production in the area from a quartz vein in quartz monzonite of the Idaho batholith. Country rock in the Thomas Creek area is predominantly Idaho batholith with scattered roof pendants of limestone, dolomite, and schistose metasedimentary rocks. Mineralized structures are quartz veins and pegmatite dikes that generally occur along faults or shear zones and to a lesser degree along contacts of the roof pendants. Scattered prospects along the Middle Fork Salmon River were staked on occurrences of uranium, fluorspar, lead, and silver.

Seafoam mining district (1E)

The Seafoam mining district is in northwestern Custer County and includes the upper reaches of Rapid River and its tributaries, principally Sulphur, Float, Seafoam, and Baldwin Creeks. The Seafoam district is sometimes considered to include the Sheep Mountain area, but for purposes of this report Sheep Mountain is considered separately. Fifty-seven mines and prospects are identified in the Seafoam mining district. The earliest known mining activity in the Seafoam district was placer mining near the Seafoam Guard Station at the confluence of Seafoam, Baldwin, and Vanity Creeks in the early 1880's. The small placer deposits were quickly depleted. By 1886, the Seafoam and Josephus mines had been discovered and high grade samples were tested at smelters at Clayton and Custer (Wells, 1983, p. 119). Custer County mining claim records indicate approximately 1,020 lode claims located within the district between 1881 and 1980, with the greatest intensity of claim locations recorded between 1901-1910 and 1961-1980. The Greyhound mine is by far the largest producer in the Seafoam mining district (Lowe and others, 1983, p. 13, 15)

The Seafoam mining district lies just inside the eastern border of the Idaho batholith and just southwest of the Casto pluton. Roof pendants and xenoliths consisting of schist and quartzite are in the southern part of the district and progressively decrease in size and number from east to west. Tertiary dacitic and rhyolitic dikes occur throughout the district with the dacite dikes being most common (Bennett, 1980). Mineralized shear zones in the district follow the dominant northwest, and to a lesser extent, northeast structural trends (Lowe and others, 1983, p. 13). Silver is a major constituent of the (lead-zinc) replacement deposits in the Seafoam district, where average composition of the estimated resources ranges from 0.9 to 2.56 oz/ton (Cater and others, 1973, p. 61). The Greyhound, Seafoam, and Blackjack mines are the most significant properties in the district.

In the early 1900's the Greyhound Mining and Milling Co. developed the Greyhound property (162) by installing milling and smelting equipment. The complexity of the ore and the high cost of transporting fluxing materials and fuel to the smelter site served to make the operation unprofitable. The silver-lead-zinc deposit at the Greyhound mine is associated with minor amounts of gold and copper. The Greyhound ore zone is reported to contain 20 to 40 oz/ton silver, 2% to 4% lead, and 3% to 4% zinc, with minor amounts of gold associated with arsenopyrite (Lowe and others, 1991). Current efforts (1988) are to develop base metal and silver resources by drifting along the mineralized structure in the lower Rufus level. Mine owners are presently considering expanding the level of exploration at the mine, and a substantial mining operation is possible at this site in the future.

North of the Greyhound mine, is a silicified zone about one-quarter mile wide. The zone is highly shattered and has lenticular masses of limonite and sparse sulfides. Cuts, pits, and adits explore replacement veins in this area, some of which are 30-ft thick.

The Seafoam mine (193) consists of 16 patented claims, the principal workings are on the Silver King claim where the lode is exposed for a length of about 600 ft and depth of about 300 ft (Treves and Melear, 1953, p. 15). The ore shoots were made up of lenticular masses arranged en echelon (Ross, 1930, p. 1). The Seafoam mine was the site of extensive activity which, in addition to mine development work, included elaborate housing facilities, and a sawmill. Little ore was shipped from the property and the mine has been idle for many years. Much of the equipment was removed from the site, and the buildings have fallen into ruin. Some diamond drilling has been done on the Seafoam property in recent years, but no major exploration activity is currently in progress (1988). Gold and silver at the Seafoam mine probably occurs in pyrite (Treves and Melear, 1953, p. 15).

Lead and silver were produced from the Josephus mine (184) beginning in 1886. Ore was recovered from loose surficial material distributed in a pattern about 1,000 ft long and 20 ft wide. Assays of hand-sorted ore ranged from 400 to 700 oz/ton silver (Wells, 1983, p. 119).

Sheep Mountain mining district (1F)

The Sheep Mountain mining district is in the northwestern part of Custer County and includes the upper part of Rapid River and its 32 tributaries, Bernard and Duffield Creeks. Twenty-six mines and prospects are identified in the Sheep Mountain mining district. Prospecting began with the discovery of lead and silver deposits in 1879 (Wells, 1983, p. 119). According to Custer County mining claim records, about 250 claims have been located in the mining district and more than one-half were located before 1910 (Leszcykowski and others, 1983, p. 10). Most were lode claims, located primarily for gold, silver, lead, and zinc. In the vicinity of Sheep Mountain, several deposits have been worked; the most productive was the Mountain King mine where handsorted ore was sporadically shipped beginning in 1884 (Ross, 1930, p. 6). Bedrock consists mostly of Idaho batholith, however, a sliver of Yellowjacket Formation trends northwesterly from Sheep Mountain across the district. Most deposits in the Sheep Mountain area are in dolomitic marble, and schist of the Yellowjacket Formation. The Yellowjacket Formation has been irregularly intruded by granitic and porphyry dikes. The deposits consist of vein and replacement deposits containing galena, sphalerite, chalcopyrite, and pyrite. All the ore-grade material is in sedimentary rock, with small amounts of finely disseminated galena and pyrite occurring in the intrusive rock (deposit type G of Worl and others, 1989).

Most of the mineral exploration activity in the district was centered in the southern part of the area near Beaver and Feltham Creeks and in the western part of the area along Fontez Creek-Sheep Mountain Road. Mineral activity in the southern part of the district was associated with blocks of metasedimentary rocks in quartz monzonite. The metasedimentary rocks are composed primarily of micaceous phyllite or schist. Associated with many of the metasedimentary blocks are pegmatite dikes and numerous quartz veins. The dominant structural trend is northwesterly and is generally aligned with structures of major deposits in the adjacent Seafoam mining district (Leszcykowski and others, 1983, p. 13; Ross, 1930; Treves and Melear, 1953). Mining activity at the western edge of the Sheep Mountain district is also associated with blocks of metasedimentary rocks; however, limestone is the dominant host rock for these mineral deposits. Lead, zinc, and iron sulfides occur in the limestone as replacement deposits (Leszcykowski and others, 1983, p. 13).

The Mountain King mine (172) is a silver-lead-zinc-copper replacement deposit (deposit type M of Worl and others, 1989) in a limestone roof pendant surrounded by quartz monzonite (Ross, 1930, p. 6; Treves and Melear, 1953, p. 16). The principal structure is a northwest-trending replacement vein containing argentiferous galena, pyrite, sphalerite, and chalcopyrite in siliceous gangue (Lowe and others, 1983, p. 14). The Mountain King mine has recorded production in excess of 3,300 tons of ore. Some of this production may have come from the nearby Happy Day mine (Leszcykowski and others, 1983, p. 12; Cater and others, 1973, p. 183-185). The workings consist of two irregular adits and an intermediate level. In the lower level, the marble is intruded by andesite porphyry. In the upper level, the ore is in limestone.

Other lode areas

The Sullivan Uranium prospect (27) was located in 1956 and consists of eight lode mining claims. Tertiary intrusive rocks with remnants of dolomitic rock are in the area. Uranium minerals occur in shear zones in pink Tertiary granite which were traced for 600 ft on the surface. Low-grade uranium-thorium resources inferred in the fracture system are estimated at 23,000 tons, averaging about 0.004% U_3O_8, 0.1 oz/ton silver, 0.1% lead, and 0.2% zinc. An estimated 800 tons of mineralized granite averaging 0.024% U_3O_8, is inferred beneath the carbonate rocks (Cater and others, 1973, p. 276-279).

Other areas in the Middle Fork Ranger District have no record of production. However, known vein deposits have been prospected for precious and base metals. Many thermal springs are in the district, but they have low potential for geothermal energy development (Cater and others, 1973; Worl and others, 1989). Small prospects mentioned by Ross (1934, p. 125) are in the Woodtick Creek drainage. Mineral resource potential in this area is thought to be inconsequential (Cater and others, 1973, p. 41).

Areas of placer interest

Areas of placer interest in the Middle Fork Ranger District are shown in figure 5. Gravel bars were explored and worked by hand methods during the early 1900's. The discovery of gold led to the location and development of lode deposits above the bars and minor development of gravels by the 1920's. Hand-fashioned wooden water diversion pipes, small bucket dredges, and sluice boxes were used to recover gold from bars and terraces during the 1930's (Carrey and Conley, 1980). Little placer mining has taken place since then and little evidence of past

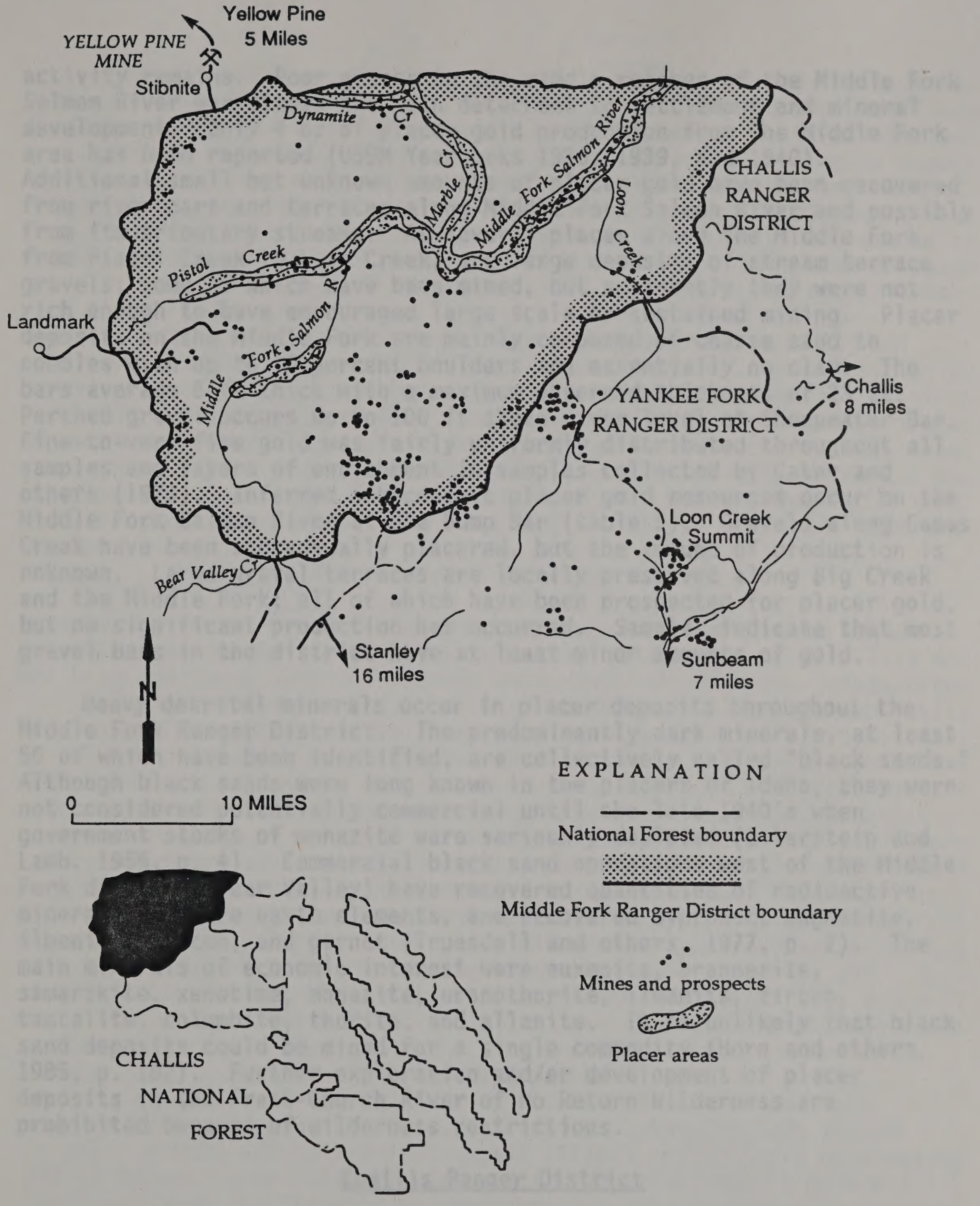
Yellow Pine
5 Miles
YELLOW PINE MINE
Stibnite
Dynamite Cr
Marble Cr
Middle Fork Salmon River
Loon Creek
CHALLIS RANGER DISTRICT
Pistol Creek
Landmark
Middle Fork Salmon R
YANKEE FORK RANGER DISTRICT
Challis
8 miles
Loon Creek Summit
Bear Valley Cr
Stanley
16 miles
Sunbeam
7 miles
N
0
10 MILES
EXPLANATION
National Forest boundary
Middle Fork Ranger District boundary
Mines and prospects
Placer areas
CHALLIS NATIONAL FOREST

FIGURE 5. - Areas of placer interest in the Middle Fork Ranger District

activity remains. Poor access to the middle reaches of the Middle Fork Salmon River was always the main deterrent to settlement and mineral development. Only 4 oz of placer gold production from the Middle Fork area has been reported (USBM Yearbooks 1936, 1939, and 1940). Additional small but unknown amounts of placer gold have been recovered from river bars and terraces along Middle Fork Salmon River and possibly from its tributary streams. At several places along the Middle Fork, from Pistol Creek to Loon Creek, are large deposits of stream terrace gravels; some of which have been mined, but apparently they were not rich enough to have encouraged large scale or sustained mining. Placer deposits on the Middle Fork are mainly composed of coarse sand to cobbles with up to 10 percent boulders and essentially no clay. The bars average 6-ft thick with a maximum observed thickness of 23 ft. Perched gravel occurs up to 100 ft above river level at Sheepeater Bar. Fine-to-very fine gold was fairly uniformly distributed throughout all samples and layers of enrichment in samples collected by Cater and others (1973). Inferred subeconomic placer gold resources occur on the Middle Fork Salmon River at Joe Bump Bar (table 5). Gravels along Camas Creek have been sporadically placered, but the amount of production is unknown. Large gravel terraces are locally preserved along Big Creek and the Middle Fork; all of which have been prospected for placer gold, but no significant production has occurred. Samples indicate that most gravel bars in the district have at least minor amounts of gold.

Heavy detrital minerals occur in placer deposits throughout the Middle Fork Ranger District. The predominantly dark minerals, at least 50 of which have been identified, are collectively called "black sands." Although black sands were long known in the placers of Idaho, they were not considered potentially commercial until the late 1940's when government stocks of monazite were seriously depleted (Eilerstein and Lamb, 1956, p. 4). Commercial black sand operations west of the Middle Fork district (Bear Valley) have recovered quantities of radioactive minerals and rare earth elements, and recovered byproduct magnetite, ilmenite, zircon, and garnet (Truesdell and others, 1977, p. 2). The main minerals of economic interest were euxenite, brannerite, samarskite, xenotime, monazite, uranothorite, ilmenite, zircon, tantalite, columbite, thorite, and allanite. It is unlikely that black sand deposits could be mined for a single commodity (Horn and others, 1985, p. 182). Further exploration and/or development of placer deposits in the Frank-Church River of No Return Wilderness are prohibited because of wilderness restrictions.

Challis Ranger District

The Challis Ranger District occupies the northeast quadrant of the Challis National Forest and includes the eastern part of the Salmon River Mountains and the northwestern parts of the Lost River and Lemhi Ranges (plates 1 and 2, and fig. 6). This district is bounded to the north by the Salmon National Forest and to the south and west by the other three ranger districts of the Challis National Forest. The Challis Ranger District covers parts of Custer and Lemhi counties. The town of Challis, located along U.S. Highway 93, near the center of the ranger district, is the administrative center for both the ranger district and the Challis National Forest. The nearest railroad is in Arco, about 80 mi to the southeast on Highway 93. Most of the district is accessible by gravel roads branching from Highway 93. The Lemhi Range is accessible by gravel roads branching from the Pahsimeroi River road. Elevations range from 3,000 to 10,000 ft.

The 37 mines and prospects in the Challis Ranger District are shown on plates 1 and 2. The principle locatable mineral commodities in the district (in descending value of past production) are tungsten, silver, copper, zinc, lead, gold, and fluorspar. The most significant mineral deposits are concentrated in three principle areas. The Parker Mountain and Garden Creek areas (plate 1, areas 2A and 2B) are in the Salmon River Mountains and the Blue Wing mining district (plate 2, area 2C), in the Lemhi Range.

Geologic setting

Rocks underlying the ranger district are Precambrian to Tertiary in age (1.7 billion to 1.8 million years old); and include metamorphic, sedimentary, volcanic, and intrusive rocks. The most important gold and silver deposits in the ranger district occur in stockwork veins and disseminations in Tertiary rhyolitic rocks of the Challis Volcanics near Parker Mountain. The principle base-metal-bearing deposits occur in fissure-veins and replacements associated with north-trending fractures in Paleozoic rocks of the Garden Creek area and in the Precambrian-age rocks that underlie the Lemhi Range at the Ima mine in the Blue Wing mining district. Most of the tungsten produced in the ranger district came from veins and lenses along fractures in Precambrian quartzite at the Ima mine. Although none has been produced, molybdenum is in veins and disseminations associated with the granitic stock underlying the Ima mine. The principle fluorite deposits occur in veins, mantos, fractures-fillings, and as breccia cement in the Paleozoic calcareous rocks near Garden Creek.

Mining activity

Mining claim records, as well as published reports, indicate that prospecting began in the Challis Ranger District in the 1860's. The first mining claims recorded in the ranger district were located in the Garden Creek area in 1866, on extensions of mineralized zones from the Bayhorse mining district. Well over 1,000 mining claims have been located; four groups of 37 patented claims are in the district (Florspar group, Kraken Hill mine, Keystone claim, and Ima mine). Production from the seven producing mines in the ranger district would have a value of

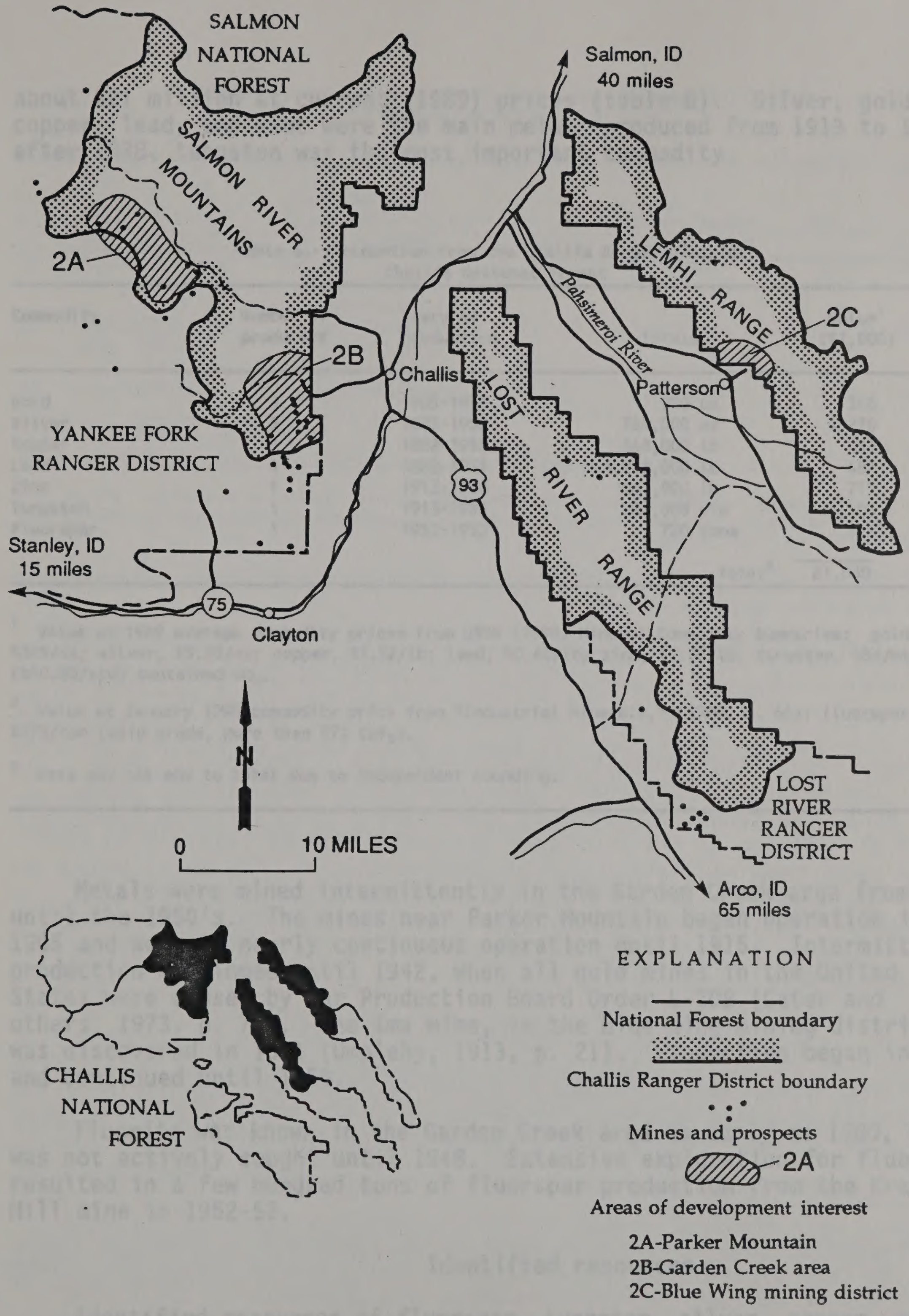
SALMON NATIONAL FOREST
SALMON MOUNTAINS
SALMON RIVER
Salmon, ID 40 miles
LEMHI RANGE
Pahsimeroi River
2A
2B
2C
Challis
Patterson
LOST RIVER RANGE
YANKEE FORK RANGER DISTRICT
93
Stanley, ID 15 miles
75
Clayton
N
0
10 MILES
LOST RIVER RANGER DISTRICT
Arco, ID 65 miles
CHALLIS NATIONAL FOREST
EXPLANATION
National Forest boundary
Challis Ranger District boundary
Mines and prospects
2A
Areas of development interest
2A-Parker Mountain
2B-Garden Creek area
2C-Blue Wing mining district

FIGURE 6. - Areas of development interest in the Challis Ranger District

about $21 million at current (1989) prices (table 6). Silver, gold, copper, lead, and zinc were the main metals produced from 1913 to 1938; after 1938, tungsten was the most important commodity.

Table 6.--Production from the Challis Ranger District, Challis National Forest

Commodity	Number of producers	Years of production	Totals	Value[1] ($1,000)
Gold	3	1905-1958	900 oz	348
Silver	5	1882-1958	769,000 oz	4,270
Copper	3	1882-1958	648,000 lb	856
Lead	4	1882-1951	1,218,000 lb	487
Zinc	1	1913-1958	861,000 lb	715
Tungsten	1	1913-1958	282,000 stu	14,300
Fluorspar	1	1952-1953	720 tons	125[2]
			Total[3]	21,000

[1] Value at 1989 average commodity prices from USBM (1990) Mineral Commodity Summaries: gold, \$385/oz; silver, \$5.55/oz; copper, \$1.32/lb; lead, \$0.40/lb; zinc, \$0.83/lb; tungsten, \$56/mtu (\$50.80/stu) contained WO_3.

[2] Value at January 1990 commodity price from "Industrial Minerals," (1990, p. 66): fluorspar \$173/ton (acid grade, more than 97% CaF_2).

[3] Data may not add to total due to independent rounding.

Metals were mined intermittently in the Garden Creek area from 1882 until the 1950's. The mines near Parker Mountain began operation in 1905 and were in nearly continuous operation until 1915. Intermittent production continued until 1942, when all gold mines in the United States were closed by War Production Board Order L-208 (Cater and others, 1973, p. 72). The Ima mine, in the Blue Wing mining district, was discovered in 1881 (Umpleby, 1913, p. 21). Production began in 1934 and continued until 1958.

Fluorite was known in the Garden Creek area as early as 1900, but was not actively sought until 1948. Extensive exploration for fluorite resulted in a few hundred tons of fluorspar production from the Kraken Hill mine in 1952-53.

Identified resources

Identified resources of fluorspar, tungsten, silver, copper, zinc, and lead at four sites in the Challis Ranger District have a combined value of about $48 million (1989 prices; table 7). Fluorspar resources

Table 7.--Summary of identified resources in the Challis Ranger District, Challis National Forest

Commodities	Number of properties with resources	Totals of contained commodity	Value[1] ($1,000)
Silver	1	660,000 oz	3,700
Copper	1	1,300,000 lb	1,700
Lead	1	1,500,000 lb	600
Zinc	1	1,400,000 lb	1,200
Tungsten	1	180,000 stu	9,100
Fluorspar	3	180,000 tons	32,000[2]
		Total[3]	48,000

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[1] Value at 1989 average commodity prices from USBM (1990) Mineral Commodity Summaries: silver $5.55/oz, copper $1.32/lb, lead $0.40/lb, zinc $0.83/lb, tungsten $56/mtu contained WO_3 ($50.80/stu contained WO_3).

[2] Value at January 1990 commodity price from "Industrial Minerals," (1990, p. 66): fluorspar $173/ton (acid grade, more than 97% CaF_2).

[3] Data may not add to total due to independent rounding.

have been identified at the Florspar group (249), Kraken Hill mine (251), and Keystone mine (258). Resources containing silver, copper, lead, zinc, and tungsten have been identified at the Ima mine (268) (table 8). Mining of the fluorspar resources was not feasible in 1988 due to remoteness of markets and inadequate prices. The metal resources at the Ima mine are too low-grade to be mineable at current prices. Mine owners were performing exploratory drilling at the Keystone and Ima mines in 1988. At least 13 other properties in the ranger district have been explored within the last 10 years.

Areas of development interest

Mining development interest is primarily centered in three parts of the Challis Ranger District: the Parker Mountain and Garden Creek areas, and the Blue Wing mining district (see figure 9).

Parker Mountain area (2A)

The Parker Mountain area is about 20 mi northwest by mountain road from the town of Challis. Heavy snowfall would hinder access and mining during winter months. Of the nine mines and prospects in the Parker Mountain area, only two, the Parker and Williams mines, have recorded production. Gold and silver valued at about $340,000 at 1989 prices, were produced from the two mines between 1908 and 1941; most of this production was before 1915.

Table 8.--Identified resources in the Challis Ranger District, Challis National Forest

Map No.	Name	Quantity (tons)	Grade	Commodity	Unit totals
249	Fluorspar group	200,000	30%	Fluorspar	60,000 tons CaF_2
251	Kraken Hill mine	4,000	55%	Fluorspar	2,200 tons CaF_2
258	Keystone mine	260,000	48%	Fluorspar	120,000 tons CaF_2
268	Ima mine	350,000	1.9 oz/ton	Silver	660,000 oz
			0.19%	Copper	1,300,000 lb
			.22%	Lead	1,500,000 lb
			.2%	Zinc	1,400,000 lb
			.5% WO_3	Tungsten	180,000 stu WO_3

Gold and silver were discovered at the Parker mine about 1904, and at the Williams mine in 1908. Soon thereafter, a small gravity/cyanide-leach mill was built nearby and operated continuously until 1915 (Ridenour and others, 1985). Mining continued sporadically until 1942, when War Production Order L-208 closed all gold mines in the country. After the war, inflation and a fixed gold price ($35/oz) precluded resumption of mining at Parker Mountain. Increased gold prices in the 1980's caused renewed interest in the properties.

The Parker and Williams mines are on opposite ends of a north-trending mineralized zone that is at least 3,000 ft long and 250 ft wide. The mine workings along the zone include at least 17 adits containing more than 1,200 ft of workings, 90 hand-dug pits and trenches, and a dismantled mill. Six exploratory holes have been drilled along the zone. Workings at the other seven prospects in the Parker Mountain area consist of four hand-dug pits. The veins in the mineralized zone are located along north-trending fractures in rhyolitic rocks of the Challis Volcanics (deposit type F of Worl and others, 1989). The veins consist of native gold, electrum, and argentite in quartz. Small fluorite veins also occur in the area (deposit type A of Worl and others, 1989).

None of the mines or prospects in the Parker Mountain area have identified resources. However, the Parker and Williams mines are likely to have resources at depth.

Garden Creek area (2B)

The Garden Creek area consists of the northern part of the old Bayhorse mining district. The southern part of the Bayhorse district is in the Yankee Fork Ranger District, and is described in a following section of this report. The Garden Creek area is about 5 mi west of the town of Challis and is accessible by the Mill Creek and Garden Creek roads.

None of the mines and prospects in the Garden Creek area have identified metal resources. There are, however, three properties with identified fluorite resources having a potential value of about $32 million. The largest, the Keystone mine, has a fluorite resource estimated at $20 million. In 1988, activity in the Garden Creek area consisted mainly of assessment work including exploratory drilling at the Keystone mine.

From 1882 to 1953, four of the 14 mines in the Garden Creek area (Skyline #8, Kraken Hill, Keystone, and the Challis View mines) produced silver, copper, lead, and fluorspar having a total value of $134,000 (1989 prices). Underground workings total about 6,000 ft in the Garden Creek area. Numerous pits, trenches, drill sites, and access roads are also present. The most notable concentration of workings consists of the many adits, shafts, cuts, drill sites, and access roads between the Keystone and Kraken Hill mines. Just outside the ranger district at the Kraken Hill mine is a small heavy-media-separation fluorite mill.

The deposits in the Garden Creek area are localized along an anticline that trends north from Bayhorse into the Challis Ranger District. The anticline is in metasedimentary rocks (mainly Bayhorse Dolomite and Ramshorn Slate) that have been intruded by granitic-to-andesitic rocks and subsequently covered by volcanic rocks. The anticlinal zone contains replacement and fissure-vein deposits from which silver, lead, and zinc, along with some copper and gold, were recovered (deposit types B and M of Worl and others, 1989). The zone also contains fissure-vein and manto deposits of fluorite which have been extensively explored (deposit type N, of Worl and others, 1989). Both metal- and fluorite-bearing deposits follow fractures and brecciation that are along bedding and small secondary folds in calcareous metasediments, mainly Bayhorse Dolomite, although the metal-bearing veins and replacements also occur in the overlying Ramshorn Slate. The metallic deposits are mainly quartz containing galena, sphalerite, chalcopyrite, argentite, and tetrahedrite and some secondary minerals, mainly native silver, cerussite, smithsonite and malachite. The fluorite deposits are of two types: (1) fissure veins ranging from a few inches to several feet wide and several tens of feet long, and (2) mantos of fluorite-cemented breccia several feet wide which occur in a stratigraphic interval of as much as 21 feet. The deposits contain mainly fluorite and barite, but also may have minor amounts of precious and base metals. The small amount of fluorite mined consisted mainly of massive fluorspar (CaF_2) surrounded by quartz and calcite. The massive fluorite ore could be upgraded by handsorting. The mantos are much larger than the veins but are of much lower grade, usually less than 30 percent CaF_2, and require beneficiation to produce a marketable product.

Fluorite was recognized to be associated with the metal-bearing veins in the area as early as 1900, but the economic opportunities were not systematically evaluated until fluorite was included in the list of strategic and critical minerals by the U.S. Government during World War II. The fluorite deposits at the Keystone mine, Kraken Hill mine, and Florspar group were claimed in 1947 and extensively explored until the market for fluorite was saturated in the mid 1950's. The exploration of the fluorite deposits has been extensive, but has resulted in production from only one of the deposits, the Kraken Hill mine.

Deposits of silver, lead, and zinc, with some copper and gold, were discovered at the Keystone mine about 1866 (Anderson, 1954, p. 6). Shortly thereafter, similar deposits were discovered to the north of the Keystone (Challis View mine, Skyline #8 mine, Blue Bird prospect, Troxpar prospect, Aztec prospect, Aztec #11 prospect, JS prospect, and G.C. Silver prospect).

Blue Wing mining district (2C)

The Blue Wing mining district is accessible by a poorly maintained road that follows Patterson Creek. The Patterson Creek road departs Pahsimeroi Valley road at the old Patterson townsite.

Of the five mines and prospects in the Blue Wing mining district, only the Ima mine has recorded production. The Ima mine is by far the largest producer in the Challis Ranger District. While operating, the Ima mine was one of Idaho's leading tungsten producers. The mine produced about $16 million (1989 prices) worth of tungsten, gold, silver, copper, lead, and zinc between 1913 and 1958. About 40 tons of tungsten ore were reportedly sent for testing from the Miller mine in the 1940's. However, no information is available on metal recovery. The Ima and Miller mines include 21 patented claims.

In 1881, deposits of silver and gold were discovered along Patterson Creek, near the Ima mine (Umpleby, 1913, p. 109). Gold, silver, copper, lead, and zinc were the principle metals recovered until 1938, when tungsten became more profitable. The Ima mine ended production in 1958 when the U.S. Government ceased to purchase tungsten. The workings at the Ima mine include three major adits and a number of sublevels, totaling more than 15,000 ft of development. These workings cover a mineralized zone at least 2,300 ft long and 800 ft wide. There has also been about 15,000 ft of diamond drilling. Large amounts of molybdenum, copper, and tungsten at depth were discovered by drilling in the 1940's. Exploration at the Ima mine is continuing.

The deposits mined in the Blue Wing district consist of polymetallic veins in northwest-trending quartzite. The quartzite has been intensely folded, fractured, and finally, intruded by a granitic stock (deposit types C and J of Worl and others, 1989). The veins are mainly quartz with fluorite, orthoclase, rhodochrosite, pyrite, huebernite, scheelite, native gold, argentite, galena, sphalerite, chalcopyrite, bornite, molybdenite, and tetrahedrite. Veins and disseminations of molybdenite, chalcopyrite, huebnerite, and pyrite in the intruding granitic stock have been explored by drilling (deposit types I and J of Worl and others, 1989).

The only identified mineral resources in the Blue Wing district are contained in the zone of veins at the Ima mine. The resources in this zone total at least 350,000 tons containing an average of 1.9 oz/ton silver, 0.19 percent copper, 0.22 percent lead, 0.2 percent zinc, and 0.5 percent WO_3 (Lowe and others, 1989; Joraleson, 1973). The identified resource has a gross value of about $16.3 million (1989 prices). The size and average grade of the molybdenum-bearing zone in the granitic stock has not been determined. In 1988, drilling at the Ima mine was the only mining activity in the Lemhi Range.

Other areas

There are four additional mines and prospects in the part of the Lemhi Range that is outside of the Blue Wing mining district. Of the four, only the H&R mine is reported to have had production, and none of the properties has identified resources. Some copper- and gold-bearing ore was produced from the H&R mine, but the amount of metal recovered is unknown (Cather and Rains, 1988). The workings at the four properties include eight adits totaling less than 1,000 ft in length, cuts, pits, trenches, and access roads. The deposits in this area consist of polymetallic veins in quartzite or volcanic rocks (deposit types C and F of Worl and others, 1989).

There are also five small, low-grade prospects in the Lost River Range segment of the Challis Ranger District. All are poorly explored and have neither recorded production, nor identified resources. The workings at the five prospects include six hand-dug prospect pits and three adits that total about 190 ft in length. The few mining claims that have been located in the Lost River Range were recorded as early as 1882. Most were in the vicinity of Grouse Creek and were on lead-, zinc-, and barite-bearing lenses. These small, irregular, poorly-exposed lenses appear to be replacements in Paleozoic-age, calcareous, metasediments.

Yankee Fork Ranger District

The largest portion of the Yankee Fork Ranger District lies between the Frank Church-River of No Return Wilderness to the north and Valley Creek and the Salmon River to the south. This area includes part or all of the Valley Creek, Yankee Fork, Thompson Creek, and other drainages that are tributaries of the Salmon River, flowing southward and eastward from the Salmon River Mountains. A portion of the Frank Church-River of No Return Wilderness, including the head waters and tributaries of Loon Creek, which flows northward to the Middle Fork Salmon River, is also part of the Yankee Fork Ranger District. The district also includes the northern end of the Boulder Mountains where Pass Creek and other tributaries flow northward and westward to the East Fork Salmon River. An isolated parcel of approximately 14 mi^2, located south of the Salmon River in the Spud Creek drainage, is also included in the Yankee Fork Ranger District. Elevations in the district range from about 5,000 ft along the Salmon River to more than 10,000 ft at peaks in the Salmon River and Boulder Mountains. Access to the area is provided by an extensive system of Forest Service gravel roads which branch from Idaho State Highways 21 and 75 and follow many of the major drainages. Heavy snowfall closes some roads from November to June.

The 250 mines and prospects identified in the Yankee Fork Ranger District are shown on plate 1 and summary descriptions of each site are in appendix A, table A3. Principal reports on mines and geology of the Yankee Fork Ranger District include a report on the silver-gold deposits of the Yankee-Fork District by Anderson (1949), a report on the geology and ore deposits of the Stanley area by Choate (1962), and a report on the mineral resources of the Frank Church-River of No Return Wilderness by Ridenour (1985).

Geologic Setting

The rocks in the Yankee Fork Ranger District can be subdivided into five main groups: (1) Precambrian sedimentary and metamorphic rocks; (2) Paleozoic sedimentary rocks; (3) granitic rocks of the Cretaceous Idaho batholith; (4) Tertiary Challis Volcanics; and (5) Tertiary batholiths and stocks (Fisher, 1985, p. 3). The major structural features in the Yankee Fork Ranger District are the Trans-Challis fault system, the Custer graben, and the Bayhorse anticline. Many mineral deposits in the district are both spatially and genetically related to individual faults and broad shear zones along the Trans-Challis fault system. Some of these deposits are in granitic rocks of the Idaho batholith and are commonly along Tertiary dikes within the granitic rocks. Other deposits are in Tertiary plutonic rocks and dikes that cut the plutonic rocks, Tertiary rhyolite, Paleozoic and Precambrian sedimentary rocks, Paleozoic and Precambrian roof pendants in the Idaho batholith and extrusive pyroclastic rocks of the Challis Volcanics. Recent stream gravels contain concentrations of placer gold along many of the rivers and streams within the district.

In the Loon Creek mining district, the major deposits are fissure-filling, gold-copper-silver veins in shoots with a gangue of quartz or quartz-siderite hosted by biotite schist intruded by dikes. These deposits contain a trace-element suite similar to Tertiary pink granites, and may be related to intrusion of the nearby Casto pluton (Ridenour and others, 1983, p. 3). The southern part of the Loon Creek district is underlain mainly by quartz monzonite of the Idaho batholith. Roof pendants, near the center of the district, are composed of Precambrian metasedimentary rocks and Paleozoic sedimentary and metasedimentary rocks. Significant mineral deposits, such as the Lost Packer Mine (305) and Monte Cristo Mine (328), occur in Precambrian schist intruded by dikes ranging in composition from dacite to rhyolite; lamprophyre dikes are also present, but rare.

The rocks underlying the Bayhorse mining district are Paleozoic- to Tertiary-age and include metasedimentary and intrusive rocks. The major commodity occurrences include silver, lead, zinc, gold, copper, and fluorspar. The deposits are in Paleozoic-age metasedimentary rocks that are uplifted, folded, fractured, and intruded by granitic rocks. Deposition of most of the fluorite and some of the lead-zinc-silver mineralization occurred along the flank of the Bayhorse anticline and was largely controlled by extensive zones of solution, brecciation, and collapse structures. Elsewhere in the district, steep faults in the Paleozoic rocks controlled the location of sulfide-bearing quartz-siderite veins (Hobbs, 1985, p. 134). Silver-lead, zinc, copper, and small amounts of gold are contained in the veins and replacements associated with north-trending fractures in the Paleozoic-age Ramshorn Slate and Bayhorse Dolomite. Fluorite veins and mantos fill fractures and cement breccia in the Paleozoic-age Bayhorse Dolomite and Ramshorn Conglomerate.

In the Yankee Fork mining district, andesite, pyroclastic rocks, and rhyolite are hosts for vein and disseminated deposits along northeast- and northwest-trending fracture zones within the Trans-Challis fault system. Dikes, small pods and pipe-like bodies of rhyolite, and multiple intrusive rhyolite complexes are scattered throughout the Custer graben. Locally they are hydrothermally altered and mineralized. The deposits are grouped along independent zones of mineralization near Bonanza, Custer, Estes Mountain, Jordan Creek and Red Mountain. Each zone of mineralization marks a zone of fracturing in the Challis Volcanics. The zones near Bonanza, Custer, and Bachelor Mountain are in the latite-andesite member and the others are in the Germer tuff member of the Challis Volcanics. Ore minerals include electrum, native gold and silver, and chalcopyrite commonly in a gangue of pyrite and fine-grained quartz (McIntyre and Johnson, 1985, p. 110). Mineralization in the Yankee Fork mining district resulted in: (1) high-grade gold-silver veins and associated chimney-like deposits; (2) stockwork veins and disseminated gold and silver in high level rhyolites; and (3) gold-silver veins having relatively high base-metal content.

A quartz-molybdenite stockwork is controlled by high-angle faults in Tertiary quartz monzonite host rocks at Thompson Creek. Also in the Thompson Creek area, disseminated scheelite occurs in skarn zones in the Paleozoic limestone beds of the Wood River Formation. In the Stanley Basin, two types of deposits contain uranium. One type consists of pitchblende-bearing veins in quartz monzonite and the other consists of uraninite and coffinite associated with carbonaceous material in bedded sedimentary rocks (Choate, 1962, p. 29).

Mining Activity

Mining has taken place in the Yankee Fork Ranger District from 1864 to the present in several organized mining districts. The Loon Creek, Yankee Fork and Bayhorse mining districts, as well as the unorganized Stanley uranium district have all been areas of significant mineral activity and have been responsible for the majority of the precious and base metals production from the ranger district. Significant production of tungsten and molybdenum has come from the Thompson Creek area. Production from the district between 1864 and 1988 would have a value of $422 million at 1989 commodity prices. Table 9 summarizes recorded production and its approximate value.

Table 9.--Production from the Yankee Fork Ranger District, Challis National Forest

Commodity	Number of producers	Years of production	Totals	Value[1] ($1,000)
Gold	45	1864-1988	135,000 oz	52,000
Silver	43	1864-1988	20,400,000 oz	113,000
Copper	21	1882-1968	9,110,000 lb	12,000
Lead	23	1882-1988	9,020,000 lb	3,610
Zinc	4	1882-1964	458,000 lb	380
Tungsten	1	1954-1980	19,000 stu WO_3	965
Molybdenum	1	1984-1988	66,000,000 lb	240,000
Uranium	5	1959-1960	33,000 lb U_3O_8	343[2]
Stone	3	1975-1988	60 tons	7
			Total[3]	422,000

[1] Value at 1989 average commodity prices from USBM (1990) Mineral Commodity Summaries: gold $385/oz, silver $5.55/oz, copper $1.32/lb, lead $0.40/lb, zinc $0.83/lb, tungsten $56/mtu contained WO_3 ($50.80/stu contained WO_3), molybdenum $3.65/lb, stone, variable depending on type ($123/ton, average for dimension stone).

[2] Value at 1989 commodity prices from "Engineering and Mining Journal" (White, 1990, p. 59): uranium $10.38/lb U_3O_8.

[3] Data may not add to total due to independent rounding.

Loon Creek mining district

Placer gold, discovered at Loon Creek in 1869 by Nathan Smith, sparked a 10 year period of mining activity (Ross, 1963). Placer deposits most heavily worked in the early days were along a strip about 75 ft wide and 1 mi long, below the mouth of Canyon Creek (Ross, 1941b, p. 43). Placer gold production was variously estimated to have an historic value between $500,000 and $2 million (Umpleby, 1913c, p. 91). Water diversion ditches and the remnants of a flume, which supported hydraulic and other operations during the 1920's, remain along 2 mi of Loon Creek near the old Casto townsite. Placers on Loon Creek were soon abandoned in favor of nearby lode deposits. Earliest known lode mining activity in the Loon Creek mining district was in 1886; about 650 mining claims have been located since that time.

Forty-three mines and prospects are in the Loon Creek mining district. USBM production records show that approximately 9,900 tons of ore were produced from six mines between 1903 and 1941 (Ridenour, 1985, p. 42). The ore produced in the past would have value of about $691,000 at 1989 prices; 58 percent from gold, 37 percent from copper, 4 percent from silver, and less than 1 percent from lead. About 98 percent of the value came from the Lost Packer mine (Ridenour, 1985, p. 42). Mining in the district has centered around the Lost Packer mine (figure 8) which was located in 1902 (Umpleby, 1913a, p. 66; Umpleby, 1913b, p. 91). Following its closure in 1917, most mining activity ceased (Ridenour and others, 1983, P. 11). The Lost Packer mine was reopened in 1984 after a 40-year hiatus and is the only mine in the district currently (1988) in production.

Bayhorse mining district

Mining claim records and published reports by Bell (1900) and Umpleby (1913c), indicate that prospecting began at the Pacific, Ramshorn and Skylark mines in the Bayhorse mining district as early as the 1860's. Well over 1,000 mining claims were located in the area since then; 28 claims are patented.

The metals deposits in the Bayhorse mining district were mined intensively from 1877 until about 1925 and then intermittently until 1964. Metals production from seven mines in the area; Skylark (515), Ramshorn (516), Barton (517), Cave (519), Keno (520), Forest Rose (521), and Pacific (522), totals about $36 million in silver and lesser amounts of copper, lead, gold, and zinc (at 1989 prices; table 9).

Fluorite was recognized to be associated with the deposits at the Pacific mine as early as 1900. Extensive exploration was done between 1948 and 1988, however, no fluorite has been produced.

Yankee Fork mining district

The first mining activity in the Yankee Fork region began in the 1860's with the discovery of placer gold deposits in Yankee Fork and Jordan Creek. Soon thereafter, lode deposits were found and the Yankee Fork mining district was organized. The first lode discovery in the Yankee Fork mining district was at the Charles Dickens (435) in 1875. Following the Charles Dickens came the Charles Wain (477) on Estes Mountain, and the General Custer (441), about 2 mi southeast of the Charles Dickens. By 1877, the Montana (474), Lucky Boy (450), Badger (449), Continental (448) and other properties near the General Custer had been located and were under development (Anderson, 1949, p. 21-34). The Yankee Fork mining district experienced much activity centered around the General Custer mine and mill until about 1905, when the General Custer mine and other operations in the area shut down. Then in 1907, the Golden Sunbeam mine (468) was opened and began large scale production. The Golden Sunbeam mine operated until about 1911. Total historic production from the Yankee Fork mining district up to 1913 is estimated at $12 million, two-thirds of which is credited to the General Custer mine (Umpleby, 1913c, p. 77). The remainder was from the Lucky Boy, Charles Dickens, Golden Sunbeam, Montana, McFadden (476), and George Washington (Morrison) (427) properties. It is estimated that about 40 percent of this early production was from gold and the remainder was mostly from silver.

A brief period of activity followed World War II which saw the consolidation of some properties in the Yankee Fork mining district. Periodic interest in the area through the 1950's resulted in discoveries and small ore shipments from numerous mines in the area. In the 1950's the Why Not (473), Golden Sunbeam, Fourth of July (453), Snowdrift (478), and other mines reported ore shipments. Recurrent activity in the Yankee Fork mining district through about 1950 resulted in an additional $1 million of gold and silver production (Anderson, 1949, p. 14).

Stanley Uranium area

The Stanley uranium district is in T11N, R13 and 14E, north of Stanley, ID. Uranium ore production from deposits in this area began about 1957. Companies involved in this early production were; Western Fluorite, Phillips Petroleum, Rare Minerals Corp. of America, and Sidney Mining Co. By 1959, about 2,000 tons of ore had been shipped from the area, most of it to the Vitro Minerals Corp. mill at Salt Lake City, UT, 380 mi to the southeast. By the end of 1960, about 7,700 tons of ore had been shipped from the Stanley area, and the average grade of all produced ore was 0.18 percent U_3O_8 (Choate, 1962, p. 40).

Current Activity

The largest active mining project in the ranger district is the Thompson Creek molybdenum mine (502), operated by Cyprus Minerals Co. This open pit mine and 25,000-ton/day capacity mill, which has been in operation since 1983, is one of only two primary molybdenum mines in the United States. The only other milling facility currently active in the district is at Preachers Cove (418), on Yankee Fork. This 250- to 300-ton/day capacity, flotation, amalgamation, concentrate-leach plant is operated by U.S. Antimony Corp. The mill currently processes ore shipments from the General Custer-Lucky Boy, the Lost Packer mine, and the Estes Mountain area. The mill also processes ore from the Yellow Jacket mine, 30 mi northwest of Challis, ID, and from other small operations in the Yankee Fork area. U.S. Antimony Corp., Lucky-Custer Gold Inc. and Sunbeam Mining Corp. (recently acquired by CoCa Mines Inc.), have been active in exploration and development of gold deposits in the Yankee Fork mining district in recent years. Coca Mines Inc. is currently seeking approval of plans to reopen the Sunbeam mine (Golden Sunbeam) (468) and is continuing exploration at the adjacent Grouse Creek property. The permitting process for the Sunbeam mine operating plan is being contested over environmental issues.

Surface exploration and deep drilling projects were undertaken at some of the previously worked properties as well as unexplored parts of the Stanley uranium area during the late 1970's and the early 1980's, but have not led to development activity. Intermittent small-scale exploration work has continued at some of the existing open pits and previously worked exposures to the present time (1988).

Recent activity in the Bayhorse mining district consists mainly of assessment work. Drilling was done at the Ramshorn (516), Skylark (515), and Pacific (522) mines as recently as 1981.

Identified Resources

Mineral exploration and development activities in the Yankee Fork Ranger District have resulted in the identification of resources at 13 locations. Some of these resources are located at properties which are currently active while others are at inactive locations. These resources include gold, silver, tungsten, molybdenum, fluorspar, uranium, ilmenite, garnet, zircon, and stone, at a total value of $1.6 billion at current (1989 average) prices (table 10).

Table 10.--Summary of Identified Resources in the Yankee Fork Ranger District, Challis National Forest

Commodity	Number of properties with identified resources	Total contained commodity	Value[1] ($1,000)
Gold	7	520,000 oz	200,000
Silver	2	11,000,000 oz	61,000
Tungsten	1	176,000 stu WO_3	8,900
Molybdenum	1	310,000,000 lb	1,100,000
Fluorspar	1	1,200,000 tons	200,000[2]
Uranium	1	20,000 lb U_3O_8	210[3]
Ilmenite	1	4,700 tons	300
Garnet	1	26 tons	2
Zircon	1	7 tons	3
Stone	1	10,000,000 tons	Variable
		Total[4]	1,600,000

[1] Value at 1989 average commodity prices from USBM (1990) Mineral Commodity Summaries: gold $385/oz, silver $5.55/oz, tungsten $56/mtu contained WO_3 ($50.80/stu contained WO_3), molybdenum $3.65/lb, ilmenite $70/mt bulk 54% TiO_2 f.o.b. Australian port ($63/ton), garnet $60-$2000/ton (industrial grade), zircon $468/mt ($422/ton), stone, variable depending on type ($123/ton, average for dimension stone).

[2] Value at January 1990 commodity price from "Industrial Minerals" (1990, p. 66): fluorspar $173/ton acid grade, more than 97% CaF_2.

[3] Value at 1989 commodity prices from "Engineering and Mining Journal" (White, 1990, p. 59): uranium $10.38/lb U_3O_8.

[4] Data may not add to total due to independent rounding.

Individual properties within the Yankee Fork Ranger District where resources have been identified are shown in table 11.

The Thompson Creek molybdenum mine (502) contains molybdenum resources in stockwork veins that will support continued operations for 15-20 years at projected production rates. Molybdenum reserves are valued at just over $1 billion at current (1989 average) prices. Reported tungsten resources in tactite, valued at about $9 million remain at the inactive Thompson Creek tungsten mine (499), also controlled by Cyprus Minerals Co.

Gold-silver resources occur as veins and disseminations within andesites, rhyolites, and pyroclastics at the General Custer-Lucky Boy and Sunbeam mines, in the Yankee Fork mining district. The combined gross value of these gold-silver resources is $259 million. Gold

Table 11.--Identified resources in the Yankee Fork Ranger District, Challis National Forest

Map No.	Mine name	Quantity (tons)	Grade	Commodity	Unit totals
286	Double Bar Placer	18,000 yd^3	0.02 oz/yd^3	Gold	360 oz
289	Tincup Bar Placer	26,000 yd^3	0.02 oz/yd^3	Gold	520 oz
290	West Tincup Bar Placer	33,000 yd^3	0.02 oz/yd^3	Gold	660 oz
293	Loon Creek Placers	150,000 yd^3	0.01 oz/yd^3	Gold	1,500 oz
363	Weidman Placer (Faith #4)	1,900,000 yd^3	0.03 lb/yd^3 0.01 lb/yd^3 4.92 lb/yd^3	Garnet Zircon Ilmenite	26 tons 7 tons 4,700 tons
386	Deer Strike	5,000	0.20% U_3O_8	Uranium	20,000 lb U_3O_8
450	Lucky Boy	1,200,000	0.063 oz/t 0.403 oz/t	Gold Silver	76,000 oz 490,000 oz
459	New Deal & Square Deal placer	29,000 yd^3	0.05 oz/yd^3	Gold	1,400 oz
468	Sunbeam (Golden Sunbeam)	7,600,000	0.06 oz/t 1.31 oz/t	Gold Silver	400,000 oz 10,000,000 oz
499	Thompson Creek tungsten mine	190,000	0.93% WO_3	Tungsten	180,000 stu WO_3
502	Thompson Creek molybdenum mine	230,000,000	0.11% MoS_2	Molybdenum	310,000,000 lb Mo
506	Flagstone 1-7	10,000,000	NA	Stone	10,000,000 tons
522	Pacific mine	3,200,000	36% CaF_2	Fluorspar	1,200,000 tons CaF_2

resources in placer deposits along Loon Creek and Jordan Creek have a combined value of $1.7 million. The Weidman (364) placer on Kelly Creek contains resources of garnet, ilmenite, and zircon with a value of about $300,000.

A small uranium resource at the Deer Strike (386) property in the Stanley area has a gross value of $208,000.

Although only fluorspar resources have been identified in the Bayhorse mining district, metallic resources are likely at the Pacific mine (522). Fluorspar resources at the Pacific mine have a gross value of about $200 million. The widespread occurrence of dolomite in the Bayhorse area is not considered to be a resource; development is unlikely in the foreseeable future.

Areas of Development Interest

Based on the locations of mines with significant past production, mines and prospects with identified resources, and areas where recent mineral exploration or development activities have been conducted, seven areas of lode development interest have been identified in the Yankee Fork Ranger District (fig. 7).

Loon Creek Mining District (3A)

Intensive development at the Lost Packer mine (305), on the north side of Canyon Creek began in 1904, and in 1905 a 100-ton/day smelter was completed. Metallurgical difficulties with the complex ore and the high cost of transporting coke from MacKay, ID, 100 mi away were major problems at the smelter. The mine and smelter were essentially closed in 1917 because of failure to find additional ore and lack of success of a new mill installed in 1916 (Shockey, 1963, p. 5). In 1979, a new vein was discovered by core drilling; this vein was crosscut in 1983 (Ridenour, 1985, p. 45). Recorded production from the Lost Packer mine is 9,874 tons of ore with an average grade of 2.0 oz/ton gold, 4.9 oz/ton silver, and 9.1 percent copper (Ridenour, 1985, p. 45). Much of this ore was taken from the higher-grade shoots of the vein system and hand sorted before transportation to the smelter. Lateral development includes about 12,750 ft of underground workings on 10 levels and 5 blind sublevels. The vein, explored over a vertical distance of 1,000 ft and a horizontal distance of about 2,000 ft, is enclosed in a fissure that strikes N5°E and dips 75°NW and is hosted by Precambrian quartz-biotite schist (Umpleby 1913c, p. 94; Ross, 1934, p. 23). The ore consists of auriferous chalcopyrite with some pyrite and pyrrhotite and a gangue of quartz, siderite, and rock fragments. The Lost Packer mine returned to production in 1985, and is presently (1988) producing ore as weather conditions permit. Gold and copper are recovered from the Lost Packer ore at the Preacher's Cove mill.

Limestone has been produced from deposits classified as contact metamorphic by Ross (1934, p. 98) at three prospects (311), (312), (316), located in the northwest part of the Loon Creek mining district. These deposits occur in limestone and marble pendants along an abandoned road south of the Ivers townsite. The limestone was quarried to provide flux for the old Lost Packer smelter, and reportedly carried small amounts of gold and silver along with pyrite and limonite (Bell, 1908, p. 73).

Argentiferous galena occurs in fissure-filling and vein-type deposits in schist and granite on the divide between Canyon Creek and Deer Creeks, at the Sunrise (313) and the Sunrise group and Lost Eagle shaft (314) prospects (Umpleby, 1913a, p. 99). The metallic metals occur in a quartz or quartz siderite gangue and are similar to deposits prevalent in the Sheep Mountain mining district to the west (Ridenour and others, 1983, p. 12).

Red Mountain area (3B)

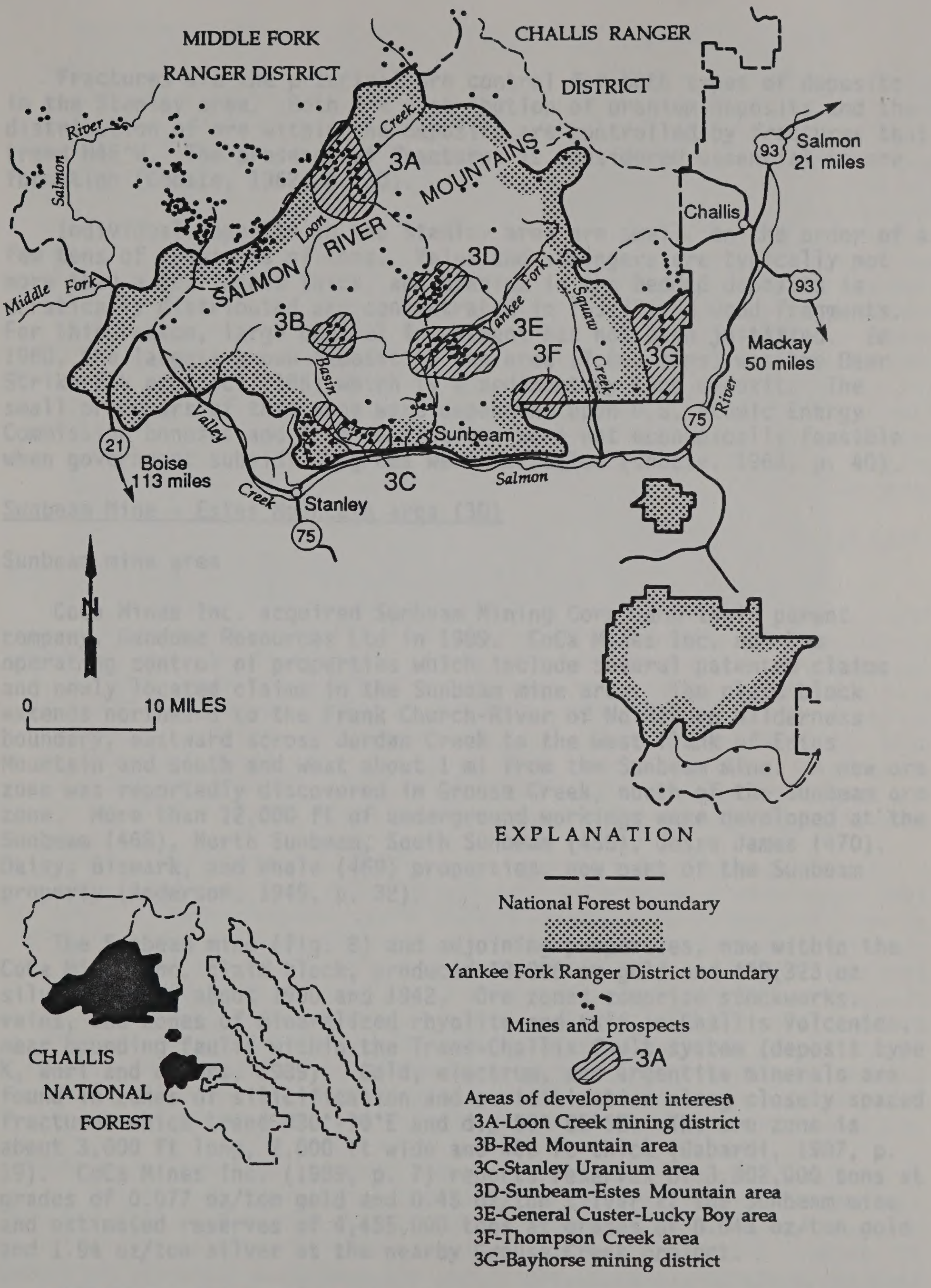
There are several groups of workings along a mineralized zone that reaches from Red Mountain to Hindman Peak Ridge. Gold and silver occur in quartz veins and wide, low-grade breccia zones (Choate, 1962, p. 94). Host rock is highly-fractured, hydrothermally-altered Challis Volcanics (deposit types F and K, Worl and others, 1989).

The main workings on Red Mountain consist of two caved adits, driven prior to the 1940's. The veins in these adits reportedly were rich in silver; a sample of the dump material contained 0.44 oz/ton gold and 2.88 oz/ton silver (Choate, 1962, p. 95). At the Independence (352) prospect, pits and two short adits, developed in the 1950's, explored quartz veins along steeply dipping faults which contained silver, gold, and fluorite. The average silver-gold ratio in 26 samples was 4:1 (Choate, 1962, p. 94). At the Hindman (348) prospect, two adits on the southwest side of Hindman Ridge each have more than 2,000 ft of underground development. Narrow seams, not more than a few inches thick, contain silver and gold. A 2-ft-thick quartz vein was reportedly discovered in a prospect pit at the base of Red Mountain on the north side of Park Creek. The vein is reported to have contained up to 600 oz/ton silver (Choate, 1962, p. 95).

The properties in the Red Mountain area have been consolidated under the ownership of Jack Niece of Stanley, ID. In 1982, Noranda Exploration leased the properties and drilled four deep holes, reportedly evaluating the area for stockwork molybdenum mineralization (deposit type J, Worl and others, 1989). In 1984, Tenneco Minerals leased the properties and drilled 35 shallow holes on Hindman Ridge to evaluate gold potential. The results did not warrant further development and both leases were dropped. In 1988, the properties were under lease to Sun Gold Exploration, a subsidiary of Sunbeam Mining Co., and geologic mapping and exploration were being conducted (Jack Niece, personal commun., 1988).

Stanley uranium area (3C)

Uranium mineralization occurs at about 30 locations across a broad zone which extends northwestward from American Creek to the areas of Noho Creek, Potato Mountain and Little Basin Creek. Two of the occurrences are placers where uranium concentrations were discovered in the black sands of Kelly and Basin Creeks. The remaining occurrences are of two general types. One type consists of pitchblende-bearing veins along fractures in granitic rocks of the Idaho batholith (deposit type H, Worl and others, 1989). Uranium minerals are also contained in carbonaceous material within bedded sedimentary rocks that overlie the batholith (Choate, 1962, p. 29). Several of the larger deposits are in the arkosic conglomerate at the base of the Challis Volcanics. Of the total reported production, about 90 percent came from bedded deposits and 10 percent from vein deposits. No commercial recovery has been reported from placer deposits (Choate, 1962, p. 40).


MIDDLE FORK
RANGER DISTRICT
CHALLIS RANGER
DISTRICT
Salmon River
Middle Fork
Loon Creek
SALMON RIVER MOUNTAINS
3A
3B
3C
3D
3E
3F
3G
Basin Creek
Valley Creek
Yankee Fork
Squaw Creek
Salmon River
Sunbeam
Stanley
Challis
93
Salmon
21 miles
93
Mackay
50 miles
75
21
Boise
113 miles
75
N
0
10 MILES
CHALLIS
NATIONAL
FOREST
EXPLANATION
National Forest boundary
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Areas of development interest
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3B-Red Mountain area
3C-Stanley Uranium area
3D-Sunbeam-Estes Mountain area
3E-General Custer-Lucky Boy area
3F-Thompson Creek area
3G-Bayhorse mining district

FIGURE 7. - Areas of development interest in the Yankee Fork Ranger District

Fractures are the principal ore control for both types of deposits in the Stanley area. Both the distribution of uranium deposits and the distribution of ore within the deposits are controlled by fractures that trend N45°W. The presence of fractures is considered essential to ore formation (Choate, 1962, p. 30).

Individual deposits in the Stanley area are small, on the order of a few tens of thousands of tons. Veins and stringers are typically not more than a few inches thick, and uranium in the bedded deposits is erratically distributed and concentrated in fossilized wood fragments. For this reason, large capital investment has not been justified. In 1960, the largest known deposit in the area (7,000 tons) was the Deer Strike-Elk prospect (386) which is a sedimentary type deposit. The small producers of this area were dependent upon U.S. Atomic Energy Commission bonuses and their operations were not economically feasible when government subsidy programs were curtailed (Choate, 1962, p. 40).

Sunbeam Mine - Estes Mountain area (3D)

Sunbeam mine area

CoCa Mines Inc. acquired Sunbeam Mining Corp. and their parent company, Geodome Resources Ltd in 1989. CoCa Mines Inc. now has operating control of properties which include several patented claims and newly located claims in the Sunbeam mine area. The claim block extends northward to the Frank Church-River of No Return Wilderness boundary, eastward across Jordan Creek to the west flank of Estes Mountain and south and west about 1 mi from the Sunbeam mine. A new ore zone was reportedly discovered in Grouse Creek, north of the Sunbeam ore zone. More than 12,000 ft of underground workings were developed at the Sunbeam (468), North Sunbeam, South Sunbeam (455), Jesse James (470), Daisy, Bismark, and Whale (469) properties, now part of the Sunbeam property (Anderson, 1949, p. 32).

The Sunbeam mine (fig. 8) and adjoining properties, now within the CoCa Mines Inc. claim block, produced 18,988 oz gold and 438,323 oz silver between about 1900 and 1942. Ore zones comprise stockworks, veins, and zones of mineralized rhyolite and tuff in Challis Volcanics, near bounding faults within the Trans-Challis fault system (deposit type K, Worl and others, 1989). Gold, electrum, and argentite minerals are found in zones of silicification and sericitization along closely spaced fractures which trend N30°-70°E and dip 50°-85°SE. The ore zone is about 3,000 ft long, 2,000 ft wide and 400 ft thick (Gabardi, 1987, p. 19). CoCa Mines Inc. (1989, p. 7) reports reserves of 3,302,000 tons at grades of 0.077 oz/ton gold and 0.45 oz/ton silver at the Sunbeam mine and estimated reserves of 4,455,000 tons at grades of 0.043 oz/ton gold and 1.94 oz/ton silver at the nearby Grouse Creek project.

The Sunbeam Mining Corp. submitted an operating plan to the USFS in 1986. According to the plan, open pit mining operations at the Sunbeam mine are scheduled to move 3.25 million tons of earth per year with 2.5 million tons as waste and about 650,000 tons as processable ore. At this rate, current reserves will support a 6 year mine life. The mine would operate about 10 months per year, closing down during spring runoff. An agglomeration-cyanide vat leach mill is planned. The mill would operate year round and is designed to process about 2,200 tons of ore per day. The proposed pit location and facilities are shown in figure 9. The final Environmental Impact Statement for the project was issued in September 1984. Sunbeam Mining Corp. had spent the past four years obtaining permits and completing preliminary work including road construction and site preparation. Concern over possible leaching of naturally occurring arsenic from spent-ore piles into the ground and nearby streams is holding up permit approval. In November 1988, the Idaho Division of Water Resources initiated contest proceedings against the planned mill. CoCa Mines Inc. is now awaiting a court ruling on the mine plan. CoCa Mines Inc. also plans to continue additional exploration and development activities on lands adjacent to the current project (Gregory A. Hahn, Chief Geological Engineer, CoCa Mines Inc, personal commun. 1989).

Estes Mountain area

The Estes Mountain properties, controlled by U.S. Antimony Corp. and its partners, consist of six patented and twenty-six unpatented lode claims, one patented and fifteen unpatented millsite claims which include most of the past producing mines. Properties on Estes Mountain with substantial underground development included the Montana (474), McFadden (476), Why Not (473), Golden Gate (479), Tonto (480), Charles Wain (477), Snowdrift (478), Mountain Chief (481), and the Halloween (Kwajalein) (467) (Anderson, 1949, p. 29-31). The first discovery in the area, at the Charles Wain was made in 1875. Development and production at various properties continued until the late 1930's.

A mill was built at Preachers Cove by U.S. Antimony Corp. in 1979-1980 to process dump material from the McFadden mine on Estes Mountain as well as dumps at the Charles Dickens mine. Ore of mineable grade was also discovered at the Castle Drift on Estes Mountain in 1985. Mining problems in 1986 curtailed operations and a new drift was begun. A resource of 100,000 tons with grades of 0.09 oz/ton gold and 11.77 oz/ton silver was identified. The U.S. Antimony Corp. (1987) annual report states, "While the company presently is mining silver and gold bearing mineralized rock, there is no commercially minable ore body at Estes Mountain and any mining operations thereon are incidental to continued exploration and development work on the property."

Several thousand feet of underground workings were developed along the two primary vein systems which extend across the top of Estes Mountain. The veins are roughly tabular; they strike N15°-40°E and dip 30°-45°NW. The veins occur within highly altered andesite, rhyolite, or tuff which overlie siltite, argillite, and quartzite along the northwest margin of the Custer graben (deposit type K, Worl and others, 1989). Chimney like zones of mineralized fractures less than 100 ft long occurred within a zone about 5,000 ft long, 1,000 ft wide and averaging 4 to 5 ft thick (Anderson, 1949, p. 29-31).

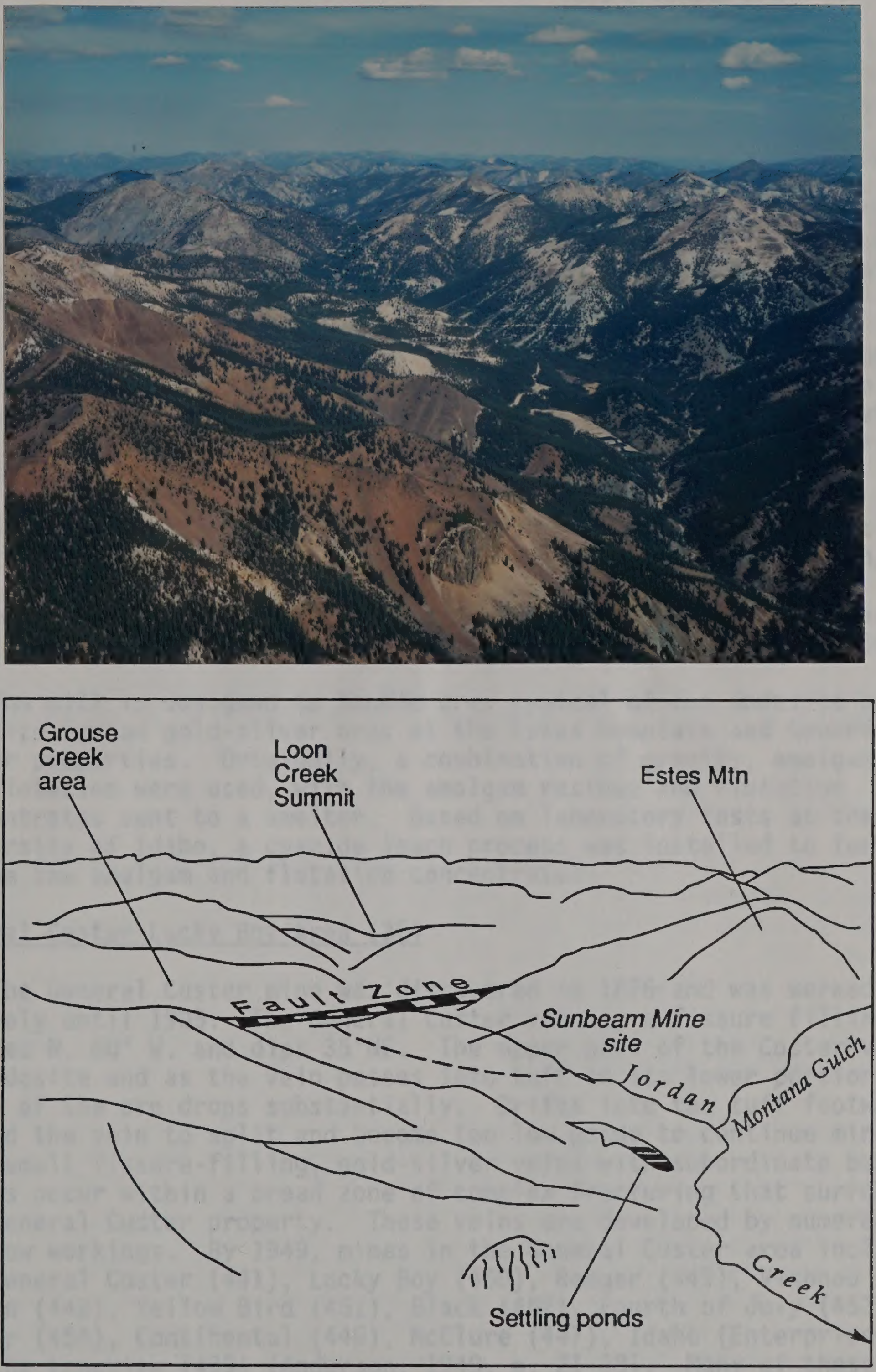

Grouse Creek area
Loon Creek Summit
Estes Mtn
Fault Zone
Sunbeam Mine site
Jordan
Montana Gulch
Creek
Settling ponds

FIGURE 8. - Upper Jordan Creek looking north. The fault zone shown is along the northern margin of the Trans-Challis fault system. Estes Mountain and the site of the proposed Sunbeam mine development along with its newly defined Grouse Creek orebody are within the Custer graben segment of the fault system.

Development of large-scale underground mines in the Estes Mountain area is unlikely based on the evidence of past operations. Grades reportedly declined steadily with depth within the veins at most locations. Reports indicate that the shallow range, less than 1,000 ft in most cases, resulted in the short life of most of these mines. Of current interest are the low grade zones of disseminated mineralization which surround the veins like those to the west of Jordan Creek at the Sunbeam mine. Broad zones of disseminated gold and silver typically surround the high grade veins.

The development of a low-grade gold mine at Estes Mountain would require similar permitting requirements as the Sunbeam mine. The successful permitting and development of the Sunbeam mine will very likely result in increased efforts to block out low-grade reserves in the geologically similar Estes Mountain area.

U.S. Antimony Corp. is currently operating the custom mill at Preachers Cove. The mill has a capacity of about 250- to 300-ton/day with a 50- to 100-ton/day cyanide leach plant. The mill uses a combination of gravity, amalgamation, and concentrate cyanide leaching. Activated charcoal loading is used to recover both silver and gold.

The mill is designed to handle ores typical of the andesite and rhyolite hosted gold-silver ores at the Estes Mountain and General Custer properties. Originally, a combination of gravity, amalgamation, and flotation were used, with the amalgam residue and flotation concentrates sent to a smelter. Based on laboratory tests at the University of Idaho, a cyanide leach process was installed to further refine the amalgam and flotation concentrates.

General Custer-Lucky Boy area (3E)

The General Custer mine was discovered in 1876 and was worked actively until 1905. The General Custer vein is a fissure filling which strikes N. 60° W. and dips 35°NE. The upper part of the Custer vein is in andesite and as the vein passes into tuff in its lower portion, the grade of the ore drops substantially. Drifts into the tuff footwall showed the vein to split and become too low grade to continue mining. Many small fissure-filling, gold-silver veins with subordinate base metals occur within a broad zone of complex fracturing that surrounds the General Custer property. These veins are developed by numerous shallow workings. By 1949, mines in the General Custer area included the General Custer (441), Lucky Boy (450), Badger (449), Vishneu (443), Mullan (442), Yellow Bird (451), Black (452), Fourth of July (453), Wire Silver (454), Continental (448), McClure (447), Idaho (Enterprise) (440) and the Longview (439) (Anderson, 1949, p. 21-28). Many of these properties are now consolidated in the holdings of Lucky Custer Gold Corp.

In 1981, Excel Minerals Company leased 15 patented and 81 unpatented mining claims, known as the General Custer-Lucky Boy property, from Lucky Custer Gold Inc. From 1981 to 1985 Excel Minerals drilled 167 exploratory holes totaling more than 23,000 ft. Consultants for Excel Minerals delineated a mineralized zone up to 600 ft wide and 1,200 ft long. The consultants estimated reserves in the mineralized zone at 1,210,328 tons of ore at an average grade of 0.063 oz/ton gold and 0.403 oz/ton silver (Lucky Custer Gold Inc., 1987). Excel Minerals began development of a surface mine at the General Custer mineralized zone in 1985; in 1986, U.S. Antimony Corp. entered into a sublease agreement with Excel Minerals to haul and mill ore from the property. In 1987, Lucky Custer Gold initiated proceedings to terminate the lease agreements. These proceedings are in progress as of 1988.

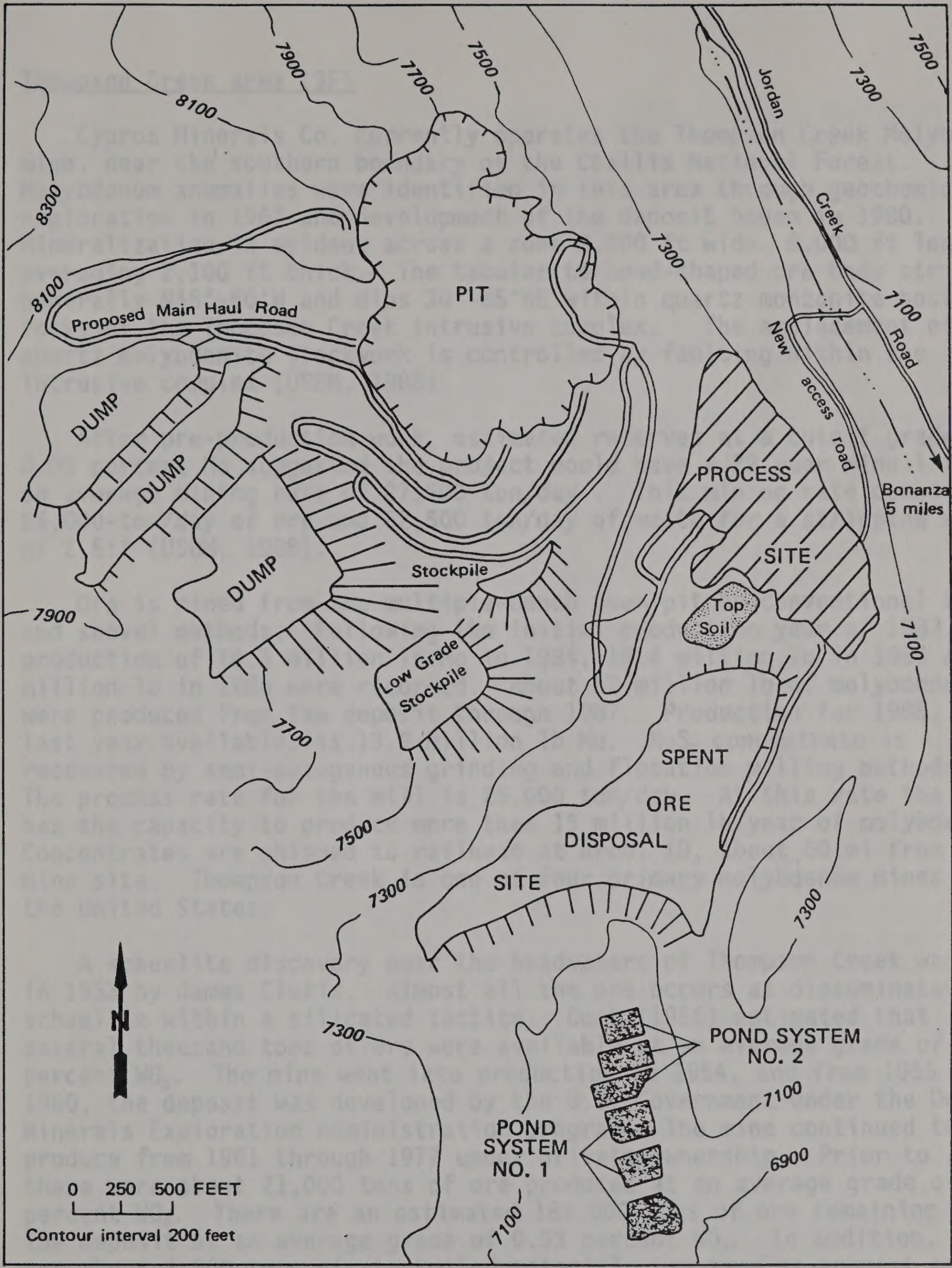
Most development in the General Custer-Lucky Boy area is concentrated in and around the old workings. These efforts seem directed at identifying extensions of previously mined veins or associated but previously undiscovered veins. The possibility of large-tonnage, low-grade gold-silver deposits exists in this area. Extensive exploration and drilling are required to identify this type of deposit and consolidation of individual holdings would be necessary to justify this type of activity.

Intermittent exploration and development activity at underground workings in the Black mine (452) area, which adjoins the General Custer-Lucky Boy area to the southeast, continues under the direction of the owners, Mr. R.M. Barrett and partners (R.M. Barrett, 1988, personal commun.).

Bachelor Mountain area

More than a dozen adits were developed along many parallel veins at the Bachelor Mountain mine (417) during the 1930's and 1940's. The principal mines on Bachelor Mountain were the Gray Eagle and Dorothy (Anderson, 1949, p. 28-29). The Gray Eagle included most of the adits which are now referred to as the Bachelor Mountain Mine. Recently, some of these adits have been reopened for testing. The operators propose to haul several truckloads of material to the Preachers Cove mill for custom milling and evaluation.

Individual veins in this area are reported to be from 2 to 8 ft thick but no more than a few hundred feet long. Some workings expose broader altered and mineralized zones up to 30 ft wide adjacent to the quartz veins (deposit types F and K, Worl and others, 1989). The existing workings on Bachelor Mountain are likely to be the focus of continued exploration and development activities in this area. The improved access will allow small scale mining and testing equipment to be placed on site and will provide access to a custom mill. Based on past reports, which indicate that grades in veins diminish with depth, any underground development of these veins should be small and short lived. The presence of low grade gold and silver resources in zones around the veins cannot be ruled out.


8100
7900
7700
7500
7300
7500
Jordan Creek
8300
8100
PIT
7300
Proposed Main Haul Road
7100
New access road
Road
DUMP
DUMP
DUMP
PROCESS SITE
Bonanza 5 miles
Stockpile
Top Soil
7900
Low Grade Stockpile
7100
7700
SPENT ORE DISPOSAL SITE
7500
7300
7300
7300
N
POND SYSTEM NO. 2
7100
POND SYSTEM NO. 1
6900
0 250 500 FEET
7100
Contour interval 200 feet

Adapted from Sunbeam Mining Corporation,
Plan of Operations, 1986

FIGURE 9. - Site plan, Sunbeam mine

Thompson Creek area (3F)

Cyprus Minerals Co. currently operates the Thompson Creek Molybdenum mine, near the southern boundary of the Challis National Forest. Molybdenum anomalies were identified in this area through geochemical exploration in 1967 and development of the deposit began in 1980. Mineralization is evident across a zone 2,500 ft wide, 8,000 ft long and averaging 2,100 ft thick. The tabular to hood-shaped ore body strikes generally N45°-60°W and dips 30°-85°NE within quartz monzonite host rocks of the Thompson Creek intrusive complex. The emplacement of the quartz-molybdenite stockwork is controlled by faulting within the intrusive complex (USBM, 1988).

After pre-production work, estimated reserves at a cutoff grade of 0.05 percent Mo suggested the project would have a 22 year mine life at an average mining rate of 87,500-ton/day . This mining rate combines 25,000-ton/day of ore and 62,500 ton/day of waste for a stripping ratio of 2.5:1 (USBM, 1988).

Ore is mined from the multiple-bench open pit by conventional truck, and shovel methods. Following the initial production year of 1983, production of 10.5 million lb Mo in 1984, 16.4 million lb in 1985 and 15 million lb in 1986 were recorded. About 52 million lb of molybdenum were produced from the deposit through 1987. Production for 1988, the last year available, is 13.9 million lb Mo. MoS_2 concentrate is recovered by semi-autogenous grinding and flotation milling methods. The process rate for the mill is 25,000 ton/day. At this rate the mill has the capacity to produce more than 15 million lb/year of molybdenum. Concentrates are shipped to railhead at Arco, ID, about 60 mi from the mine site. Thompson Creek is one of four primary molybdenum mines in the United States.

A scheelite discovery near the headwaters of Thompson Creek was made in 1953 by James Clutis. Almost all the ore occurs as disseminated scheelite within a silicated tactite. Cook (1956) estimated that several thousand tons of ore were available at an average grade of 0.5 percent WO_3. The mine went into production in 1954, and from 1955 to 1960, the deposit was developed by the U.S. Government under the Defense Minerals Exploration Administration program. The mine continued to produce from 1961 through 1977 under private ownership. Prior to 1980, there were about 21,000 tons of ore produced at an average grade of 0.84 percent WO_3. There are an estimated 189,000 tons of ore remaining in the deposit at an average grade of 0.93 percent WO_3. In addition, there are about 4,000 tons of stockpiled material; two samples suggest an average grade of 0.14 percent WO_3 (USBM, 1988). In 1980, the deposit was sold to Cyprus Minerals Co. and has been idle since that time.

Bayhorse mining district (3G)

The Bayhorse mining district is along Bayhorse Creek 1 mi to 3 mi west of the historic Bayhorse townsite. The area is accessible by a maintained gravel road that departs Idaho State Highway 93 about 13 mi south of Challis, ID. Thirteen mines and prospects are in the part of the Bayhorse mining district administered by the Challis National Forest.

Seven of the these, (Ramshorn, Skylark, Barton, Pacific, Forest Rose, Cave, and Keno mines), have records of production, yielding silver, copper, lead, and gold valued at more than $45 million (at 1989 prices) between 1877 and 1964 (table 11). The zinc contained in the ore had no market until after 1911 and so was not recovered from most of the ore produced. The Ramshorn and Skylark mines have the largest recorded metal production in the area. Thirty mining claims in five groups (Ramshorn mine, Skylark mine, Pacific mine, Maude and Vermont, and Juliet Lode) were patented between 1881 and 1921.

Metal deposits were discovered at the Ramshorn, Skylark, Barton, Pacific, Forest Rose, Cave and Keno mines by 1866. Production began in about 1877. The first ore was secondarily-enriched and high enough in grade for direct shipment to smelters at Bayhorse and Clayton. When the secondarily-enriched deposits became depleted, by 1900, a 60-ton/day mill was built to produce concentrates from the lower grade sulfide ore. This mill, built on Bayhorse Creek directly below the Skylark and Ramshorn mines, operated from 1917 until dismantled in 1925. A second mill of similar size, also dismantled, was built at the Pacific mine in the 1930's. The Pacific mill treated a small amount of ore from the Pacific mine and some hand-sorted ore from the nearby mines, including the Skylark and Ramshorn. The seven mines with recorded production are located along the north side of Bayhorse Creek and cover an area 3-mi-long (westerly), 1.5-mi-wide (northerly). These mines include at least 39 major underground workings (adits, shafts, sublevels, drifts, and raises), totaling more than 11 mi in length. Several sites were drilled as recently as 1980. Workings at the other mines and prospects in the Bayhorse area include more than nine underground workings that total at least 1,600 ft in length, many bulldozer and hand dug pits and trenches, and many miles of access roads.

The deposit types in the Bayhorse mining district include polymetallic fissure-veins, irregular replacements of base and precious metals, and fluorspar veins and mantos (deposit types B, M and N, Worl and others, 1989). These deposits are hosted by Paleozoic-age, calcareous and siliceous metasedimentary rocks that have been intensely folded and fractured, and intruded by granitic stocks. The metals-bearing veins and replacements are mainly quartz that contain argentite, galena, sphalerite, chalcopyrite and tetrahedrite which weathered at the surface to form the secondary minerals native silver, cerussite, smithsonite and malachite. The fluorite veins are mainly massive fluorspar (CaF_2), surrounded by quartz and calcite. The mantos consist mainly of dolomite breccia which is cemented by fluorite. The mantos are much larger than the veins but are much lower in grade and would require beneficiation to produce a marketable product.

Placers

Placer deposits have been developed in the Yankee Fork Ranger District mainly in areas downstream from gold-bearing quartz veins (fig. 10); descriptions of individual locations (at 43 sites) are in appendix A, table A-3. A variety of placer recovery equipment, ranging from small-scale sluice methods to dry land dredge and dredge boats, have been used in the district since the late 1860's. In all known cases, most of the gold occurs in the gravel 18 in. above bedrock and on weathered bedrock. At Stanley Creek, some gold concentration is reported in clay layers, "false bedrock", in the overburden (Choate, 1962, p. 126).

Placer gold was discovered in Jordan Creek and Yankee Fork in the early 1860's. Small-scale placer operations were successful in both stream channels and along many smaller tributaries through the early 1900's. Due to the depth of the overburden, early workings were drifts along bedrock which reached from the mouth of Jordan Creek to Red Rock Gulch. Between 1948 and 1950, a 1 yd^3 bucket line dredge operated along the lower 1.25 mi of Jordan Creek (466). Placer operations have also been successful along tributaries of Jordan Creek, principally Montana Gulch and Red Rock Gulch. Both of these gulches are narrow and steep and operations have been restricted to the use of smaller scale equipment (Choate, 1962, p. 105). Yankee Fork is the largest tributary of the Salmon River, with a valley floor up to several hundred feet wide. A 650 ton, 8 ft^3 dredge boat operated on Yankee Fork (419) from the late 1930's to 1942, 1946 to 1947, and from 1950 to 1952. Dredged ground on Yankee Fork extends for about 5.25 mi below the mouth of Jordan Creek and averages 400 ft wide. Two tributaries of Yankee Fork, Adair Creek and Rankin Creek have been worked by small scale placer methods (Choate, 1962, p. 105-108).

Placer deposits were also identified during the 1870's along Stanley and Kelly Creeks and in the broad flat which separates their headwaters. Kelly Creek flows from Potato Mountain about 4 mi northeast to Basin Creek. Remnants of placer workings are apparent along the entire length of the creek. Placer operations, at some scale, have been almost continuous since the 1870's (Choate, 1962, p. 108-110).

Stanley Creek flows from Potato Mountain about 7 mi southwest to Valley Creek. The upper and lower portions of the creek are relatively narrow and the central portion is up to 1.5 mi wide. Most placer development has been along the upper, more shallow portion of the creek and along Doran Gulch, a tributary of Stanley Creek. Overburden in the valley floor of the wide central portion of Stanley Creek is over 50 ft thick where tested, and too deep to mine. Placer activity along the upper parts of Stanley Creek was nearly continuous from the late 1870's to the 1950's. The area has received little attention since then. Attempts to operate a gold dredge on Stanley Creek from 1900 to 1914 were complicated by the presence of clay layers within the gravels. The dredge was redesigned several times with limited success (Choate, 1962, p. 112-113).

Placer deposits have been identified along many of the tributaries on the north side of the Salmon River between Stanley and Clayton. Joe's Gulch placer (371), below the Iron Crown mine, was extensively mined and is credited with as much as 5,000 oz of gold recovered prior to about 1916. Small placers have also been worked along Nip and Tuck Creek, American Creek, Upper Harden Creek, and Gardner Creek (Choate, 1962, p. 116-119).

Placer gravels occur along the West Fork Yankee Fork and Cabin Creek, which flow from the south and north slopes of Red Mountain, respectively. Some of the ground along the upper West Fork Yankee Fork was tested for placer gold by the owners of the Yankee Fork Dredge and high gold values were indicated (Choate, 1962, p. 120). The Yankee Fork Dredge was too large to traverse the narrows leading to this area, but a drag line similar to the one which operated on Jordan Creek may be able to operate in this area. Small scale placer activity is evident along the nose of Hindman Ridge.

Placer deposits of probable Pleistocene age (Ross, 1941b, p. 430) occur along the middle reaches of Loon Creek from Canyon Creek to Shell Creek, a distance of about 4.5 mi. Placer gravel occurs as individual bars on the southeast side of Loon Creek but is continuous along the northwest side of the creek from Casto to Transfer Campground. The deposits have an average width of 1,000 ft and comprise the elevated flood plain of the creek and terraces, which are as much as 100 ft above the present channel (Ross, 1941b, p. 43). The gravel bars average 6 to 8 ft thick, but range to 40 ft thick. Washed boulders and oversize material from past placer mining lie on irregular granite or schist bedrock surfaces 5 to 25 ft above the present stream level. Gravel in the bars is principally coarse sand to cobble-sized with less than 10 percent boulders and almost no clay. Fine- to very, very-fine gold is uniformly distributed throughout the deposits. Gold is concentrated at the alluvium-bedrock interface but the quantity is highly variable between locations. Coarse gold, with nuggets weighing 1 oz, were reported near bedrock during early development (Umpleby, 1913c, p. 94).

Placer deposits on Loon Creek have inferred, marginally economic gold reserves and inferred, subeconomic gold resources, see table 11 (Ridenour, 1985, p. 172; U.S. Bureau of Mines and U.S. Geological

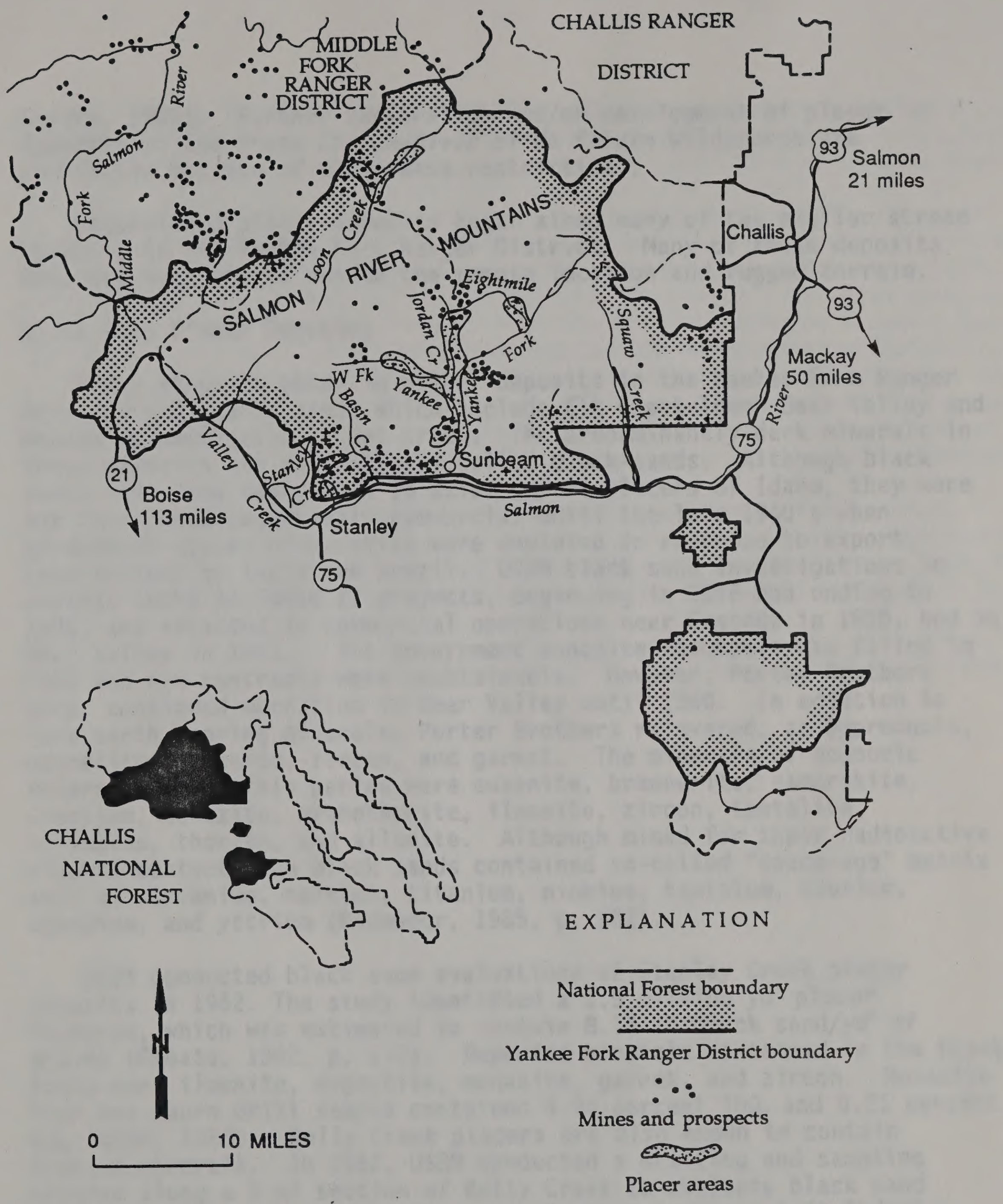

CHALLIS RANGER
DISTRICT
MIDDLE
FORK
RANGER
DISTRICT
Middle
Fork
Salmon
River
SALMON RIVER MOUNTAINS
Loon
Creek
Eightmile
Jordan Cr
Yankee
Fork
W Fk
Yankee
Basin
Cr
Squaw
Creek
Challis
93
Salmon
21 miles
93
Mackay
50 miles
River
75
Sunbeam
Valley
Creek
Stanley
Cr
Stanley
Salmon
21
Boise
113 miles
75
CHALLIS
NATIONAL
FOREST
N
0
10 MILES
EXPLANATION
National Forest boundary
Yankee Fork Ranger District boundary
Mines and prospects
Placer areas

FIGURE 10. - Areas of placer interest in the Yankee Fork Ranger District.

Survey, 1980). Further exploration and/or development of placer deposits in the Frank Church-River of No Return Wilderness are prohibited because of wilderness restrictions.

Undeveloped placer deposits occur along many of the smaller stream channels in the Yankee Fork Ranger District. Many of these deposits have not been worked due to the remote location and rugged terrain.

Black Sand Placer Deposits

Heavy minerals occur in placer deposits in the Yankee Fork Ranger District and nearby areas which include Elk Creek-lower Bear Valley and Hoodoo Meadows-Yellowjacket Creek. The predominantly dark minerals in these deposits are collectively called black-sands. Although black sands have long been known to exist in the placers of Idaho, they were not considered potentially commercial until the late 1940's when government stocks of monazite were depleted in response to export restrictions by India and Brazil. USBM black sand investigations in central Idaho included 27 projects, beginning in 1948 and ending in 1955, and resulted in commercial operations near Cascade in 1950, and in Bear Valley in 1951. The government monazite stockpile was filled in 1955 and new contracts were unobtainable. However, Porter Brothers Corp. continued operation in Bear Valley until 1960. In addition to rare earth-bearing minerals, Porter Brothers recovered, as byproducts, magnetite, ilmenite, zircon, and garnet. The minerals of economic interest during this period were euxenite, brannerite, samarskite, xenotime, monazite, uranothorite, ilmenite, zircon, tantalite, columbite, thorite, and allanite. Although mined for their radioactive element content, the black sands contained so-called "space-age" metals such as zirconium, hafnium, titanium, niobium, tantalum, thorium, scandium, and yttrium (Ridenour, 1985, p. 182).

USBM conducted black sand evaluations of Stanley Creek placer deposits in 1952. The study identified a 1.9 million yd^3 placer resource, which was estimated to contain 8.16 lb black sand/yd^3 of gravel (Choate, 1962, p. 112). Reported minerals contained in the black sands were ilmenite, magnetite, monazite, garnet, and zircon. Monazite from one churn drill sample contained 4.94 percent ThO_2 and 0.21 percent U_3O_8 (USBM, 1988). Kelly Creek placers are also known to contain uranium minerals. In 1952, USBM conducted a drilling and sampling program along a 1 mi section of Kelly Creek to evaluate black sand placers. The program identified gravels that averaged 4.92 lb/yd^3 ilmenite, 1.41 lb/yd^3 magnetite, and 0.13 lb/yd^3 monazite (USBM, 1988). Some of the commodities in these deposits, mainly niobium and tantalum, are of critical importance to the United States because of total dependence upon foreign sources, and the lack of domestic reserves. Rare earth metals are also in demand. One major problem in extracting rare earths from these deposits is the presence of thorium in the monazite. Thorium is not in demand now, and the radioactive byproduct from rare earth extraction is a disposal problem (Hedrick, 1985).

World and domestic demand for ilmenite, garnet, zircon and rare earths increased in 1987 and 1988, and is expected to increase through 1990. Demand for individual rare earths is expected to change at varying rates as a result of the wide variety of uses. The domestic and world demand pattern for rare earths continued to shift towards individual compounds and metals and special mixtures, and the capacities to separate and produce these products were increasing to meet the changing demand pattern.

Current activity

During 1988, three gold placer operations employing heavy equipment were active in the Yankee Fork Ranger District. George Castle, leasing a portion of the 400 acre claim block held by Viola Evans near the head of Kelly Creek (363, fig. 11), uses a bulldozer and front-end loader to

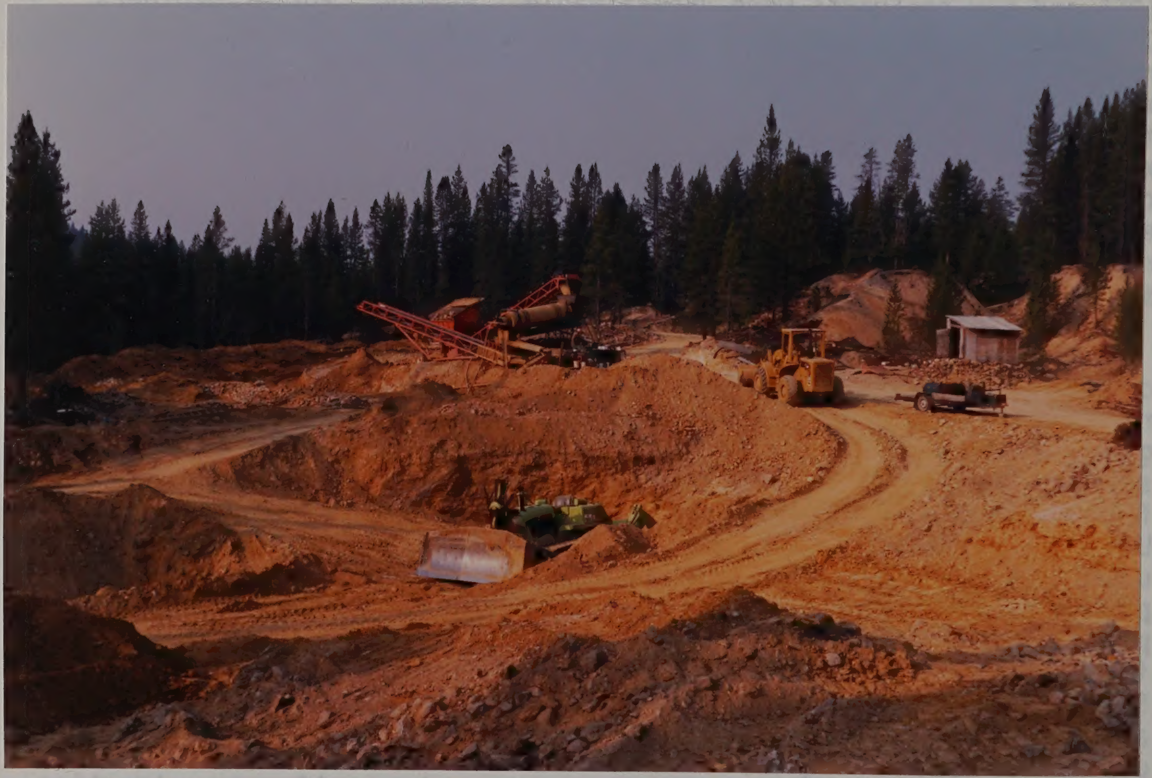


FIGURE 11.--Placer mining operation at the Weidman property (Faith No. 4) near Kelly Creek (plate 1, No. 363).

supply material to a 20-ton/hour capacity spiral trommel. A Wilfley table and mechanical gold screw are used for final gold separation. The operation uses water from holding ponds. Because no stream flow is available to recharge the ponds, years with little rainfall result in water capture insufficient to operate at design capacity. According to Mr. Castle, previous testing indicates the area currently being placered contains gold-bearing gravel which would support his operations for many years at the current rate of production.

About 2 miles south of the Castle operation, Mark Anderson is currently (1988) processing placer gravel from Joes Gulch (371). A tractor-loader supplies gravel to a wash plant which consists of a spiral trommel for rough concentration and a sluice for final separation and recovery. The operation relies on recirculated water from temporary holding ponds constructed in the bottom of the gulch. Water is hauled to the site because there is normally no surface flow in the gulch. Gold-bearing material remaining in Joes Gulch is sufficient to support only a small operation of the kind currently under way. Water limitations could force suspension of operations during periods of depressed gold prices.

Placer work at the New Deal and Square Deal property (459) on Jordan Creek continued in 1988. The owners of the recently patented property tested a small area with full scale operating equipment. A 1.5 yd^3, track-mounted excavator supplied material to a 50-ton/day capacity wash plant. The operation relies on recirculated water supplied from Jordan Creek, which is a steady source of recharge for system water. The operators indicated that test results were encouraging, with recovery of coarse, angular gold up to 3/8 in. in diameter.

The New Deal and Square Deal patent owners also have claim interest along 2.5 mi of Jordan Creek at the Olga Marie (Moonbeam) (458), between the New Deal and Square Deal patents and the upper extension of the dredge tailings. The portable wash plant and excavator were moved to an area just above the dredge tailings for further testing and evaluation in 1988. Placer gravel along Jordan Creek could support small scale placer operations, using heavy equipment, for many years.

Since small quantities of gold can be sold at market prices, there is incentive for small scale operations. The economies of scale enjoyed by high capacity mines do not place competitive pressure on the small operator. The profitability of small scale placer operations is determined by the cost to produce each ounce and the market price for gold. During periods of high gold prices, significant levels of small scale and recreational placer mining is likely. The productive history and accessibility of streams in the areas north of Stanley and Sunbeam will likely attract many small scale operators to these areas. Operations which can sustain themselves on impounded and recirculated water, or ones that are so small as to not create significant sediment load in the streams are the only ones likely to pass environmental restrictions in the Yankee Fork Ranger District.

Lost River Ranger District

The Lost River Ranger District, in the southeastern part of the Challis National Forest, covers the drainages of the Lost River and Little Lost River and their tributaries. Most of the Pioneer and White Knob Mountains between Ketchum and Mackay, ID, are included as well as the southern part of the Lost River Range and western slope of the southern Lemhi Range, east of Mackay. Two hundred mines and prospects have been identified in the Lost River Ranger District and are shown on Plate 1. Summary descriptions of each site are in Appendix A, table A4.

Access is primarily from U.S. Highway 93 which passes from Arco through Mackay to Challis along the valley of the Big Lost River. The mostly paved Trail Creek Road connects U.S. Highway 93 north of Mackay with State Highway 75 at Ketchum by way of Trail Creek Summit (elevation 7,896 ft). A good gravel road (USFS No. 128) branches north from the Trail Creek Road along the North Fork of the Big Lost River. Another road toward the south (USFS No. 135) provides access to mines and prospects in the Copper Basin area and ultimately connects with U.S. Highway 93 south of Mackay by way of Antelope Creek. A third route exits north from Copper Basin, also connecting with U.S. Highway 93. Mines and prospects in the Lemhi Range are accessible from roads that branch from the secondary route along the valley of the Little Lost River. Only one route, a very rough road from Sawmill Creek, crosses the Lemhi Range. Two roads cross the Lost River Range, through Doublespring Pass and Pass Creek Summit, and connect with U.S. Highway 93. Ketchum, Mackay, Arco, and Idaho Falls are the main centers for supplies to support mining activities in the district.

Mineral resource information on many properties in the Lost River Ranger District has come from USBM studies of several proposed wilderness areas in the Lost River Ranger District. These include the Boulder-Pioneer study area by Tuchek and Ridenour (1981), the White Cloud-Boulder RARE II area by Johnson (1983), the Borah Peak study area by Capstick and others (1987), the Lemhi Range study area by Cather and Rains (1988), and the Diamond Peak study area by Kuizon and Lipton (1989). In addition, reports on individual deposits that resulted from work under the Defense Minerals Exploration Administration are cited extensively in Appendix A, table A4.

Geologic Setting

The Lost River Ranger District is underlain by rocks ranging from Proterozoic sedimentary beds as old as 1.7 billion years to surficial deposits that are currently accumulating along modern streams.

Tectonism and igneous intrusion have controlled and modified mineralization, remobilized primary deposits and created structures along which mineralizing fluids can move. The oldest mineralized rocks are quartzites in the southern Lemhi Range that host lead-, zinc-, and silver-bearing veins. Proterozoic gneissic rocks at the head of Wildhorse Creek in the Pioneer Mountains contain tungsten-bearing skarn deposits in a metamorphic complex. Paleozoic rocks in the Lemhi Range, White Knob Mountains, and Pioneer Mountains consist mainly of quartzite, dolomite, limestone, and silty clastic rocks. These rocks host deposits of various types: lead, silver, and zinc in polymetallic veins; copper, gold and tungsten in skarns; gold, silver, and lead in irregular replacements; stratabound silver, lead, zinc, gold, and copper; and uranium and vanadium in mineralized shear zones. Nonmetallic commodities including veins of barite and beds of limestone, dolomite, and quartzite (silica) are in the Paleozoic terranes of the White Knob Mountains and the Lost River and Lemhi Ranges. Tertiary intrusive rocks contain stockwork molybdenum occurrences in the Pioneer Mountains and apparently served as the mechanism for the development of the skarn, vein, and replacement deposits in the Pioneer and White Knob Mountains and in the Lemhi Range. Tertiary-age Challis Volcanics contain gold- and antimony-bearing veins in the White Knob Mountains. None of the modern stream gravels in the ranger district have produced placer gold, and only small amounts of gold have been found in alluvium. See Worl and others (1989) for a comprehensive description of the geology, mineralization types, and potential for resources within the ranger district.

Mining Activity

The Lost River Ranger District and the adjoining region have a long history of intermittent mining activity. Mining expanded into this part of the forest following the discovery of the Galena and Minnie Moore deposits near Ketchum in 1879 and 1880, respectively. Discoveries were made in the Copper Basin, Alder Creek, and Alta mining districts west of Mackay, and in the Badger Creek area and Dome mining district east of Mackay in the early 1880's. Between about 1887 and 1982, 43 mines in the Lost River Ranger District produced gold, silver, copper, lead, zinc, tungsten, antimony, iron ore, and manganese with a value of $142 million at current (1989 average) commodity prices. Table 12 shows the economic impact of past mining within the ranger district.

Although beginning in the 1880's, mining in the Lost River Ranger District was small scale until 1902 when substantial development was done at the Empire mine in the Alder Creek mining district. Production of copper, silver, and gold ores averaged more than 26,000 tons annually through 1930. Average annual production was less than 200 tons through the remainder of the 1930's. World War II caused revitalization of copper mining at Mackay; an average of almost 3,000 tons of ore were mined annually between 1940 and 1947. Production again slacked off in

Table 12.--Production from the Lost River Ranger District, Challis National Forest

Commodity	Number of producers	Years of production	Totals	Value [1] ($1,000)
Gold	23	1902-1979	42,100 oz	16,200
Silver	36	1887-1982	2,300,000 oz	12,800
Copper	30	1900-1981	62,800,000 lb	82,800
Lead	33	1887-1982	59,100,000 lb	23,600
Zinc	18	1926-1981	6,590,000 lb	5,470
Tungsten	4	1942-1956	7,610 stu	386
Antimony	1	1970	3,510 lb	3
Iron ore [2]	2	1961-1974	696,000 ltu	404
Manganese	1	1963-1974	14,300 ltu	41
			TOTAL[3]	142,000

[1] Value at 1989 commodity prices from USBM (1990) Mineral Commodity Summaries: gold $385/oz, silver $5.55/oz, copper $1.32/lb, lead $0.40/lb, zinc $0.83/lb, tungsten $55/mtu contained WO_3 ($50.80/stu contained WO_3), manganese $2.85/ltu, iron ore $0.58-$0.74/ltu (pelletized), antimony $0.99/lb.

[2] These resources may not be amenable to pelletizing for the iron ore industry; value calculations may be misleading.

[3] Data may not add to total due to independent rounding.

the late 1940's, but picked up in 1957 and continued with brief interruptions through 1975, during which time more than 100,000 tons of ore were mined.

Substantial quantities of lead and silver were produced from the Horseshoe and White Knob mines, just north of the Empire mine in the Alder Creek mining district between 1916 and 1928. After lying idle during the depression years of the 1930's, lead production at the two mines picked up again in the late 1930's and continued through World War II. Zinc production began in the late 1920's; it soon ended but resumed in the war years of the 1940's. After closing at the end of World War II, the two mines again produced zinc along with lead and silver on a substantial scale from 1960 through 1971.

The level of mining activity in the Lemhi Range paralleled that in the Alder Creek district. The Wilbert and Badger mines produced most of their lead and zinc between 1910 and 1930. The dumps at the Wilbert mine were reworked during World War II.

The Phi Kappa mine deposit, in the Alta mining district, was discovered at about the same time as the Empire mine but significant production did not take place until 1926. The mine intermittently produced lead-zinc-silver ores; mainly in the mid-1950's, mid-1960's, and mid-1970's. The Phi Kappa was last operated in 1981 when lower grade ores were mined.

Tungsten was mined in the early 1940's in the Alder Creek mining district (Empire and Silver and Lead Bell mines) and in the mid-1950's in the Pioneer Mountains (Wildhorse mine).

Activities at the smaller producing mines in the Lost River Ranger District closely followed those of the major mines and for the same reasons, prevailing national priorities and economic conditions.

At least 46 properties in the ranger district have had exploration, development, or production activity in the last 10 years. In 1988 mining activity was concentrated west of Mackay. Along the North Fork of the Big Lost River, Westmont Minerals, Inc. (Spokane, WA) was evaluating a silver-lead-zinc deposit (Bear Creek prospect, 529; John Hiner, personal commun., 1989). At the Copper Basin mine (594), Western Gold Exploration and Mining Co, Limited Partnership (Westgold) drilled several holes for gold in 1988 (Greg Shafter, personal commun., 1989). Both of these projects are expected to continue in 1989.

Identified Resources

Resources have been identified at 20 localities in the Lost River Ranger District. Those resources, including gold, silver, copper, lead, zinc, tungsten, molybdenum, iron, manganese, and fluorspar have a gross value of $310 million at current prices (table 13).

The greatest resource value is in the stratabound deposit at the Phi Kappa mine (table 14), where contained zinc, lead, and silver are worth about $169 million. Other zinc-lead-silver resources are nearby at the Long Trail, Alto Silver-Quartz, Star 1, and Silver Dew deposits; they have a combined value of more than $28 million.

The second most valuable concentration of identified resources is in the Alder Creek mining district, primarily at the Empire mine, where copper alone would have a value of almost $60 million. Lead, zinc, silver, and gold resources in the mining district are estimated to be worth another $5.6 million. Identified resources of zinc, lead, silver, and copper at six sites in the Lemhi Range would have a combined value of $7.2 million.

Areas of Development Interest

Within the Lost River Ranger district, mines and prospects with past production or identified resources are mostly concentrated in nine mineralized areas (fig. 12).

Table 13.--Summary of identified resources in the Lost River Ranger District, Challis National Forest

Commodity	Number of properties with identified resources	Total contained commodity	Value[1] ($1,000)
Gold	2	1,700 oz	660
Silver	13	6,900,000 oz	38,000
Copper	6	49,000,000 lb	65,000
Lead	12	130,000,000 lb	52,000
Zinc	7	140,000,000 lb	120,000
Tungsten	2	660,000 stu	34,000
Molybdenum	1	220,000 lb	800
Iron ore	2	500,000,000 ltu	[2]
Manganese	1	360,000 ltu	1,000
Fluorspar	1	720 tons	120[3]
		TOTAL[4]	310,000

[1] Value at 1989 average commodity prices from USBM (190) Mineral Commodity Summaries: gold \$385/oz, silver \$5.55/oz, copper \$1.32/lb, lead \$0.40/lb, zinc \$0.83/lb, tungsten \$56/mtu contained WO^{23} (\$50.80/stu contained WO_3), molybdenum \$3.65/lb, manganese \$2.85/ltu, iron ore \$0.58-\$0.74/ltu (pelletized).

[2] These resources may not be amenable to pelletizing for the iron ore industry; value calculations may be misleading.

[3] Value at January 1990 commodity price from "Industrial Minerals" (1990, p. 66): fluorspar \$173/ton (acid grade, more than 97% CaF_2).

[4] Data may not add to total due to independent rounding.

Alta mining district (4A)

Nineteen mines and prospects are in the Alta mining district at the head of Summit Creek, mostly in the drainages of Little Fall Creek, Big Fall Creek, and Phi Kappa Creek. The Phi Kappa mine (550) was discovered and patented in 1885; five other deposits in the area were discovered and put into production between 1928 and 1944. The most substantial production was from stratabound, syngenetic, sulfide deposits at the Phi Kappa and Black Rock (542) mines (deposit type Q of Worl and others, 1989); metals produced include silver, lead, zinc, gold, and copper. The zone at the Phi Kappa mine averages 4 ft thick and extends for 4,000 ft along strike and possibly 1,000 ft downdip (Tuchek and Ridenour, 1981). Workings at the mine include six adits with about 4,200 ft of underground development. The Phi Kappa last produced in 1981; owner Ivan Taylor, Mackay, ID, is considering reopening the mine in light of recent metal price improvements. At current prices, the metals produced at the Phi Kappa mine between 1926 and 1981, would be worth \$1.6 million; the gross value of identified

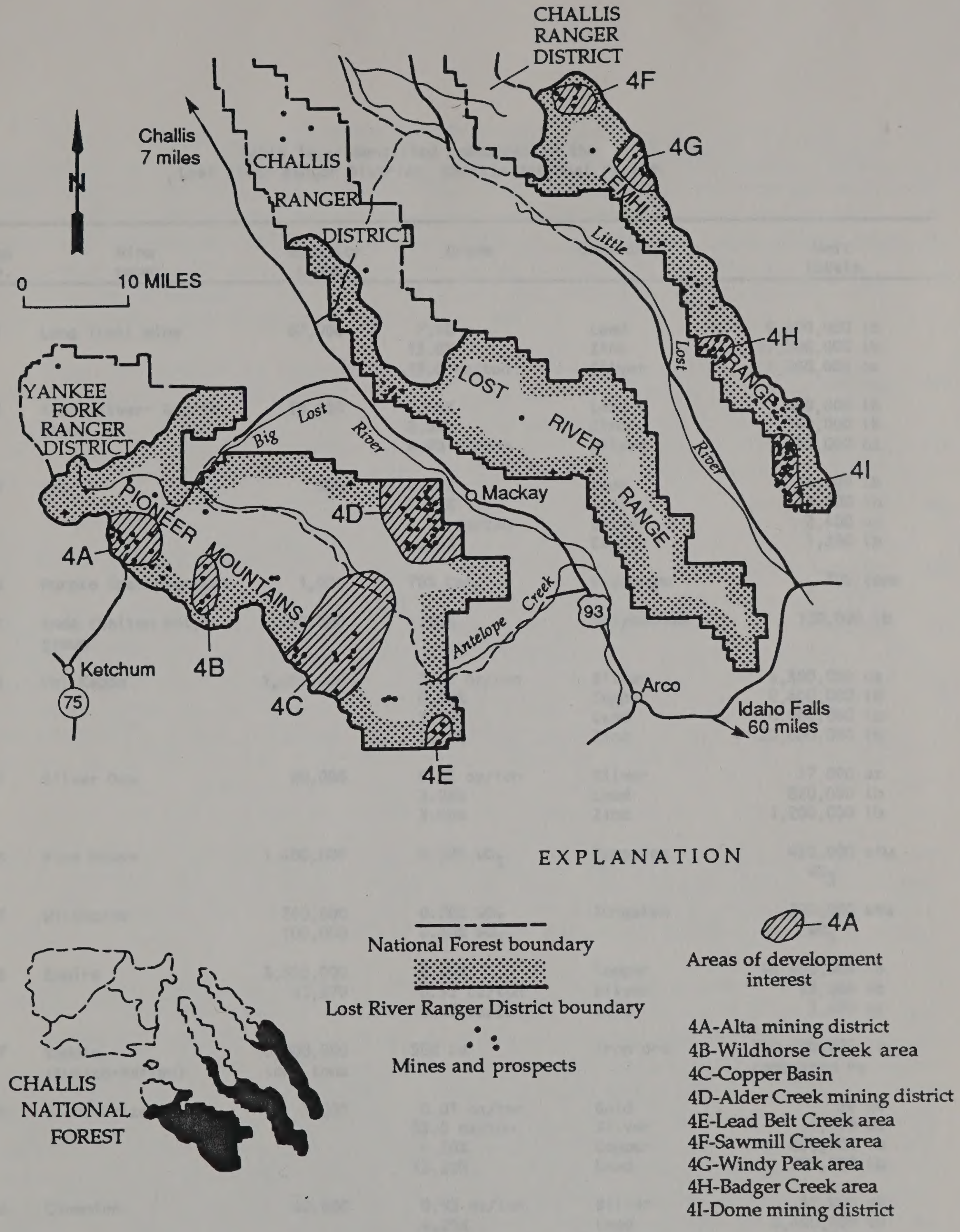

CHALLIS RANGER DISTRICT
4F
4G
Challis 7 miles
N
CHALLIS RANGER DISTRICT
LEMHI
Little
0 10 MILES
Lost
4H
YANKEE FORK RANGER DISTRICT
LOST RIVER RANGE
RANGE
Big Lost River
River
4I
PIONEER MOUNTAINS
Mackay
4D
4A
Antelope Creek
93
Ketchum
4B
4C
Arco
75
Idaho Falls 60 miles
4E
EXPLANATION
National Forest boundary
Lost River Ranger District boundary
Mines and prospects
4A
Areas of development interest
4A-Alta mining district
4B-Wildhorse Creek area
4C-Copper Basin
4D-Alder Creek mining district
4E-Lead Belt Creek area
4F-Sawmill Creek area
4G-Windy Peak area
4H-Badger Creek area
4I-Dome mining district
CHALLIS NATIONAL FOREST

FIGURE 12. - Areas of development interest in the lost River Ranger District

Table 14.--Identified resources in the Lost River Ranger District, Challis National Forest

Map No.	Mine name	Quantity (tons)	Grade	Commodity	Unit totals
531	Long Trail mine	67,000	7.0%	Lead	9,400,000 lb
			13.0%	Zinc	17,000,000 lb
			19.0 oz/ton	Silver	1,300,000 oz
535	Alto Silver- Quartz group	18,400	2.40%	Lead	880,000 lb
			2.00%	Zinc	740,000 lb
			4.90 oz/ton	Silver	90,000 oz
539	Star 1	500	4.40%	Lead	44,000 lb
			1.85%	Zinc	18,000 lb
			4.70 oz/ton	Silver	2,400 oz
			.13%	Copper	1,300 lb
540	Purple Spar prospect	1,000	70% CaF_2	Fluorspar	700 tons
541	Anda (Walton Moly) group	50,000	.22%	Molybdenum	130,000 lb
550	Phi Kappa	1,655,000	3.20 oz/ton	Silver	5,300,000 oz
			0.08%	Copper	2,600,000 lb
			3.35%	Lead	110,000,000 lb
			3.48%	Zinc	120,000,000 lb
551	Silver Dew	20,000	0.85 oz/ton	Silver	17,000 oz
			2.06%	Lead	820,000 lb
			3.09%	Zinc	1,200,000 lb
556	Pine Mouse	1,400,000	0.32% WO_3	Tungsten	450,000 stu WO_3
557	Wildhorse	200,000	0.70% WO_3	Tungsten	200,000 stu WO_3
		100,000	0.60% WO_3		
576	Empire	3,500,000	0.65%	Copper	46,000,000 lb
		23,370	0.95 oz/ton	Silver	22,000 oz
			0.07 oz/ton	Gold	1,600 oz
577	Saddle (Ausich-Barton)	10,000,000 long tons	50% Fe	Iron ore	500,000,000 ltu contained Fe
578	Grand Prize	3,000	0.01 oz/ton	Gold	30 oz
			53.0 oz/ton	Silver	16,000 oz
			4.30%	Copper	260,000 lb
			13.20%	Lead	790,000 lb
586	Champion	40,000	0.93 oz/ton	Silver	37,000 oz
			4.20%	Lead	3,400,000 lb
			4.30%	Zinc	3,400,000 lb

Table 14.--Identified resources in the Lost River Ranger District, Challis National Forest

Map No.	Mine name	Quantity (tons)	Grade	Commodity	Unit totals
654	Bell View	10,000	60% Fe	Iron ore	540,000 ltu contained Fe
			40%	Manganese	360,000 ltu contained Mn
658	Automatic	2,400	0.24 oz/ton	Silver	580 oz
			3.00%	Copper	140,000 lb
679	Whitebird (Mormon Gulch)	1,500	3.00 oz/ton	Silver	4,500 oz
			10.0%	Lead	300,000 lb
680	Bighorn (Mormon Gulch 1-3)	2,000	3.00 oz/ton	Silver	6,000 oz
			8.0%	Lead	320,000 lb
686	Sentinel (North Creek 1)	37,500	2.70%	Lead	2,000,000 lb
			8.50%	Zinc	6,400,000 lb
687	Wilbert	3,000	2.00 oz/ton	Silver	6,000 oz
			13.0%	Lead	780,000 lb
697	Great Western	4,900	1.70 oz/ton	Silver	8,300 oz
			0.50%	Copper	49,000 lb
			3.60%	Lead	350,000 lb

resources is $173 million. At the Black Rock mine, workings consist of two adits about 100 and 150 ft long. The Black Rock is the second largest producer in the Alta mining district; at current prices the value of past production would be worth $12,000.

Of the 17 remaining localities, 13 are steeply to gently dipping veins in argillite, slate, limestone, mudstone, sandstone, and quartzite. The veins generally contain galena, sphalerite, pyrite, chalcopyrite, wolframite, and scheelite in a quartz matrix (deposit types B and I of Worl and others, 1989). Two of the vein deposits, Long Trail (531) and Alto Silver (538) have produced silver, lead, zinc, and copper with a gross value of $14,000. Four of the vein deposits, Long Trail, Alto Silver, Star 1 (539), and Silver Dew (551), contain identified resources with metal values of $28 million. Underground workings on the veins include at least 18 adits as much as 500 ft long, several shafts, and numerous open cuts and pits. Individual veins are 0.5 to 3 ft thick and extend from several tens to several hundreds of feet in length. The owner of the Long Trail mine (Leonard Wall, personal commun., 1988) reported that development work was done in 1987 to mine a small tonnage of ore.

Two localities, Anda (541) and Big Joe-Lost Summer (549), are stockwork molybdenum occurrences in Tertiary igneous intrusive rocks. They consist of numerous molybdenite- and pyrite-bearing quartz veins and veinlets in quartz monzonite that contain molybdenite and pyrite (deposit type J of Worl and others, 1989). The mineralized areas were discovered in the early 1940's; the Anda (Walton Moly) deposit was drilled by Norandex, Inc. in 1969-1973, but identified resources are small (Tuchek and Ridenour, 1981).

The two remaining deposits are the Purple Spar (540), which is a fluorite-bearing fault zone in quartzite and argillite, and the Basin Group (546), which is a skarn zone along a contact of calcareous argillite with quartz monzonite. An identified resource of about 1,000 tons of about 70 percent fluorite is at the Purple Spar deposit (Tuchek and Ridenour, 1981).

Wildhorse Creek area (4B)

The five properties in the Wildhorse Creek area are polymetallic skarn deposits (deposit type L of Worl and others, 1989). The skarn zones are in a band of marble within a Proterozoic gneiss complex. The zones extend for as much as 2 mi in outcrop and range from 1 ft to 13 ft thick. Tungsten in irregular pods was discovered in 1953 at several localities. Three zones at the Wildhorse mine (557) yielded tungsten valued at $380,000 (at current prices) between 1954 and 1956 (Simons, 1981, p. 168); tungsten resources with a gross value of $11 million were estimated by Hollingsworth (1983). The deposit was most recently drilled in 1985. The two main adits at the Wildhorse mine have more than 1,135 ft of underground workings; other workings include a 170-ft adit and several open cuts. Identified low-grade resources at the Pine Mouse prospect (556) have a gross value of $23 million (Tuchek and Ridenour, 1981, p. 214).

Copper Basin area (4C)

Mining activity was first recorded at three places in the Copper Basin area along Star Hope Creek, on the east flank of Muldoon Canyon, and at the head of Lake Creek, in 1881. The Copper Basin area is underlain by Paleozoic clastic and carbonate rocks that were intruded by Tertiary plutons with associated dikes and sills; Eocene Challis Volcanics overlie older rocks in places. Eight of the sixteen properties, including three of the four past producers, Copper Basin (594), Gamebet (605), and Mackinaw (606), are polymetallic skarns (deposit type L of Worl and others, 1989) which produced copper, lead, zinc, silver, and gold valued at $900,000. Host rocks are Mississippian limestone and calcareous argillite. Four properties are polymetallic veins in black shale (deposit type B of Worl and others, 1989), including the Star Hope mine which was the first deposit discovered in the area. The four remaining properties are veins or limonitic zones in intrusive rock and andesite porphyry which are only sparsely mineralized.

About $50,000 in historic production of lead and silver was reported from the Star Hope mine (607) prior to 1890; the ore being concentrated in two hand jigs before shipment (Umpleby, 1917, p. 105). USBM records show production of copper, silver, and gold from the Star Hope as late as 1953. The deposit at the Copper Basin (Reed and Davidson) mine was discovered in 1888. A 30-ton/day smelter was built at the mine in 1900 to treat the oxidized copper ores but proved unsuccessful (Umpleby, 1917, p. 104). About $230,000 (about $1.1 million at current prices) in copper and lead was produced, mainly between 1912 and 1919 (Ross, 1930, p. 10). The Copper Basin mine was drilled by the Utah International Corp. in 1981.

At the sixteen properties in this area, 30 adits and 3 shafts once provided access to more than 6,000 ft of underground workings; many are now caved. The most extensive workings are at the Copper Basin mine which was mined partly from a glory hole in addition to five adits and a shaft. Other workings include numerous pits, trenches, and open cuts. Sixteen claims in three groups (Star Hope, Mackinaw, and Copper Basin mines) are patented; mineral surveys were done between 1889 and 1921. Although exploration activity has sporadically increased, the mines and prospects in the area have been essentially idle in recent years.

Alder Creek mining district (4D)

Of the 31 properties in the Alder Creek mining district, at least 16 have records of past production. Copper, lead, zinc, silver, gold, and tungsten with a value of $117 million, were produced from the mines, between the mid-1880's and 1982. Twenty-five mining claims and two mill sites were patented between 1889 and 1915. The Empire mine (576), one of the few major copper deposits in Idaho, is by far the largest producer in the district, not only of copper but also of silver and gold.

Copper was discovered at the Empire mine (fig. 13) on the eastern slope of Mackay Peak about 1884; soon thereafter a 50-ton/day smelter was built in the canyon of Cliff Creek. The smelter ran intermittently with varying success for a few years. Large-scale operations began about 1901 when a smelter with two 125-ton/day blast furnaces was built in Mackay. The Empire mine ran continuously through 1930 and intermittently through 1982; production has been in large part through a system of sub-leases. The Empire mine has open pit and underground workings in a zone about 3,500 ft long and 400 ft wide, over a vertical range of about 1,500 ft. The main working is at an elevation of about 7,900 ft (700 level); the lowest level, the Cossack Tunnel is at 7,010 ft. In 1956 an intermediate level was driven at an elevation of about

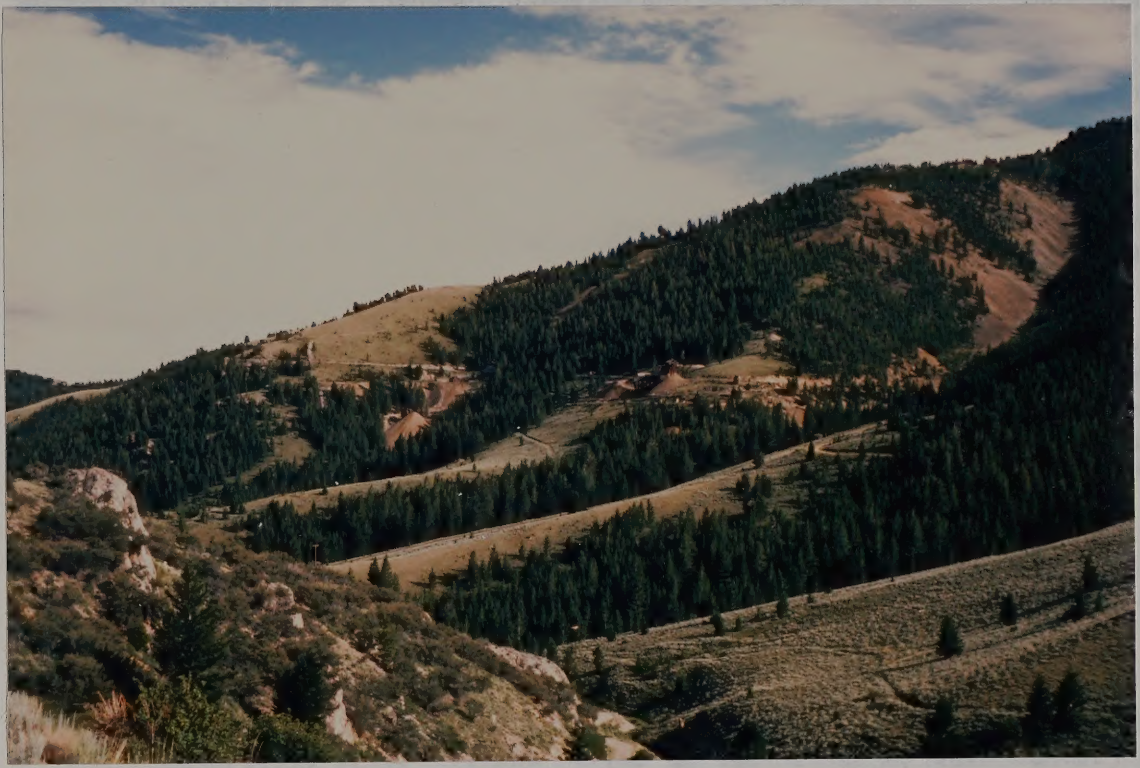


FIGURE 13.--Empire mine, main level portals, looking south.

7,500 ft (the 1100 level), and in 1961 a flotation mill was built at the portal to treat sulfide ore encountered in the development. Total horizontal workings exceed 60,000 ft. An open pit was developed and pilot leach plant was built in the 1970's at the southern end of the deposit to test recovery of oxidized copper ores. The value of total production at the Empire mine, from 1901 through 1982, is $105 million.

Workings at other mines in the district include more than 100 adits with horizontal development exceeding 15,000 ft, about 25 shafts aggregating about 1,500 ft vertically with sublevels totalling at least 4,000 ft, and at least 85 pits, trenches, and open cuts of various sizes. The Horseshoe (572), White Knob (573), Doughboy (Veteran) (566), Champion (586), and Blue Bird (574) mines were the major producers of lead, zinc, and silver.

Nearly all of the deposits in the Alder Creek district are polymetallic skarns or veins (deposit types L and D of Worl and others, 1989) along a north-trending, arcuate contact of Mississippian White Knob Limestone with Tertiary leucogranite porphyry or granite (Nelson and Ross, 1968). The skarn zones consist of chalcopyrite, pyrite, pyrrhotite, magnetite, hematite, sphalerite, galena, tetrahedrite, and scheelite in a gangue of garnet, diopside, calcite, and quartz. Secondary minerals predominate locally in the deeply oxidized ores; they include azurite, malachite, brochantite, chrysocolla, cuprite, cerussite, smithsonite, pyrolusite, and limonite. Ore bodies are irregular to pipe-like zones within or along margins of the skarns. The bodies commonly are elliptical in plan and pitch steeply eastward.

The Navarre Creek prospect (563) produced a small amount of antimony in 1970. A gold target has been identified near the head of the drainage; it was drilled most recently in 1981. Mineralization occurs as irregular pyritic zones and stibnite-bearing quartz veins in rhyolite and latite porphyry of the Challis Volcanics.

Three properties in the district, the Empire, Grand Prize (578), and Champion mines, have identified resources of gold, silver, copper, lead, and zinc with a gross value of $66.7 million. The Saddle (Ausich-Barton) deposit (577) has a resource of 10 million long tons that contain 50 percent iron.

Current activity consists mainly of assessment work at the known deposits. A new adit was driven to develop and mine sulfide ores at the Horseshoe mine in 1977; resulting ore was milled at the Empire mine flotation mill. Adit rehabilitation and drilling by Nicor Mineral Ventures in 1984 on the Kenneth Wayne (567) claims failed to reveal the gold-silver target sought.

Lead Belt Creek area (4E)

The five properties in the Lead Belt Creek area are primarily polymetallic veins in black shale or limestone (deposit types B and D of Worl and others, 1989). The veins are mainly of calcite and contain galena and sphalerite with small amounts of tetrahedrite and pyrite. The veins occur in sheared zones that have been traced in outcrop and underground workings for as much as 2,700 ft along strike; individual veins are commonly 2 to 3 ft thick. An irregular replacement ore body at the Butte-Antelope mine (616) is the source of most recent production. The replacement body is in the upper part of a gently dipping limestone bed as much as 8 ft thick. The ore is largely oxidized (cerussite and hemimorphite) but contains some galena and sphalerite. Challis Volcanics, mostly andesites, cover the Paleozoic rocks to the west and north of the main workings. Rhyolitic dikes transect the sediments south of the Butte-Antelope workings.

Mines in the Lead Belt Creek area were first worked about 1890, but extensive development took place mainly between 1905 and 1913. At least 14 adits and 4 shafts had more than 2,500 ft of workings; many of the workings are caved or filled by subsequent development. The deposits were mined by open pit operations in later years. The value of past production for silver, lead, zinc, copper, and gold from the Lead Belt (615) and Butte Antelope mines through 1975 is about $360,000.

Exploration drilling was conducted in 1984 and 1985 at the Butte-Antelope (Lowboy) property and in 1986 at the Lead Belt (Big Dipper) mine. An exploratory drill hole was planned to test for gold and silver on the Silver Haze (617) claims in 1984.

Sawmill Creek area (4F)

The six properties in the upper part of Sawmill Creek drainage are of three distinct deposit types. The Roosevelt (636), Trey (637), and Lady May (640) properties are precious metal veins in quartzite. Quartz veins, as much as 2 ft thick, in Ordovician Kinnikinic Quartzite at the Roosevelt and Trey claims contain 0.002 to 1.3 oz/ton gold and 0.1 to 0.26 oz/ton silver. One vein may extend 6,000 ft from the Roosevelt workings to the Trey claim (Dow, 1960). Quartz veins at the Lady May mine are 0.3 to 1.2 ft thick and extend for as much as 1,000 ft in Proterozoic quartzite. USBM records show that the Lady May recovered gold, silver, and copper from 3 tons of ore in 1935.

The other deposit types are lead-silver veins in Devonian dolomite at the Oregon (639) prospect, and narrow barite veins in Proterozoic quartzite at the Pay Day (638) prospect. At the Oregon mine, Dow (1960) reported samples from 0.7- to 1-ft-thick shear zones that contained 50.4 to 59 percent lead and 0.4 to 0.6 oz/ton silver. The steeply dipping barite veins at the Pay Day prospect in places are at least 0.5 ft thick and exposed for as much as 75 ft along strike (N. 80° E.). The pit at location 636 is in relatively unmineralized dolomite.

The present claims were located mainly between 1932 and 1954. Development at the various sites include: six adits with at least 1,000 ft of workings; one 40-ft shaft; and several pits, trenches, and open cuts. In 1974, exploration drilling and bulldozer work was done at the Lady May mine by the Gold Canyon Mining Co. Trenching was done by a lessee on barite veins at the Pay Day prospect in 1980.

Windy Peak area (4G)

The Windy Peak area is a westward extension of the Spring Mountain mining district where mining activity began in the early 1880's (Umpleby, 1913a, p. 85). A 50-ton/day smelter was built at Hahn along the eastern foothills of the Lemhi Range in the spring of 1909. Some ore from the Teddy (646), Elizabeth (647), and Red Warrior (648) mines was hauled to the smelter in 1910.

The most significant deposits in the Windy Peak area are polymetallic veins and irregular replacements in Ordovician dolomite (deposit types D and M of Worl and others, 1989). The dolomite normally overlies Kinnikinic Quartzite, although faulting has greatly complicated structures. Tertiary intrusive rocks form stocks and sheets within the Paleozoic strata and have caused locally metamorphosed zones, especially in the dolomite. Veins follow fractures either along or across bedding; replacements are commonly along bedding. The veins generally strike toward the north or northeast and dip steeply west. Galena, pyrite, chalcopyrite, and sphalerite are the primary ore minerals but the mineralized zones are commonly deeply oxidized to limonite and base-metal carbonates and sulfates. The Sims Magnetite (Bruce, 643), Teddy, Elizabeth, Red Warrior, and Dividend (Big Smoky, 649) mines produced silver, lead, copper, and gold valued at $367,000 between 1908 and 1941. A copper-bearing skarn zone with a magnetite core (deposit type L of Worl and others, 1989) at the Sims Magnetite (Bruce) deposit produced small amounts of gold and silver in 1901.

The eight properties within the Windy Peak area are developed by at least eight adits and six shafts that aggregate at least 1,400 ft of underground workings. Numerous trenches, open cuts, and pits have also been dug in the mineralized zones.

Recent mining activity in the area includes exploration around old workings on the Teddy (Medicine) claims, surface trenching on the Little Windy (Silverside, 644) claims, and sampling on the Bear Hat claims (USFS, 1988).

Badger Creek area (4H)

The eighteen properties in the Badger Creek area are in what was once known as the Hamilton mining district. Mining activity here began in the 1880's with the discovery of the Badger mine (666), the largest producer in the district.

The deposits are mainly polymetallic veins in dolomite or quartzite (deposit type C of Worl and others, 1989). The host rocks are thrust faulted and folded along general northerly trends; local fracture zones are favorable for mineralization. Altered and mineralized zones are centered on north- to northwest-trending, high-angle faults. The mineralizing process included formation of jasperoid in dolomite and carbonate minerals in quartzites. Ore minerals are mainly argentiferous galena, commonly altered to anglesite or cerussite, and sphalerite with small amounts of malachite, azurite, and smithsonite. The Automatic mine (658) is primarily a copper mine, although the oxidized copper-bearing zones are the same veins and lenses that contain the lead and silver mined at other properties. Gangue minerals include calcite, quartz, and barite, along with iron and manganese oxides.

Three mines in the district, Automatic, Badger King (663), and Badger, have produced lead, silver, copper, and gold that would have a value of $150,000 at 1988 commodity prices. Only the Automatic mine has identified resources (table 16); all other known deposits have been largely mined out. Production was mainly in the years immediately preceding World War I (1907-1916). Development at the properties in the district include at least 61 adits with an aggregate of more than 4,500 ft of workings; 8 shafts; and 96 pits, trenches, and open cuts. The district has been idle since 1951 except for small-scale exploration and mining claim assessment.

Dome mining district (4I)

Lead and silver were discovered in the southern Lemhi Mountains in about 1880. The Dome mining district (formerly Blackburn mining district) was established in 1882 (Ross, 1933, p. 2) with development of deposits at the Wilbert mine (687). The Wilbert mine was worked with little or no production until 1891. Production started when work resumed in 1906; a 100-ton/day mill was built in 1908. Concentrates were shipped to smelters in Utah or Nicholia, ID, 75 mi to the east. The mill operated until destroyed by fire in 1918. A long crosscut, the Daylight Tunnel, was started from the canyon of North Creek in 1922, and a new mill was built in 1924. Although the Wilbert was the largest producer in the district, three other mines, Sentinel (686), Great Western (697), and Ajax (706), added to the total production of lead, silver, copper, zinc, and gold between 1901 and 1982, which would have a value of $19.2 million at current prices. Production from the Ore House 7-8 (688) and Lookout mines (695) is included with that from the Wilbert. Identified resources at the Sentinel, Wilbert, and Great Western mines contain lead, silver, and copper with a gross value of $6.7 million.

The deposits consist mainly of polymetallic veins and shear zones in quartzite, dolomitic quartzite, and dolomite (deposit type C of Worl and others, 1989). Ore zones are commonly controlled by northwest-trending, steeply dipping faults, but in places extend irregularly into surrounding quartzite or dolomite. Zones at the Wilbert mine have been traced for 2,000 ft along strike and to a depth of 750 ft. Secondary ore minerals, including cerussite, anglesite, and smithsonite, prevail in most deposits. Galena is locally disseminated in unbroken but bleached and limonitic country rock.

The 33 properties in the Dome district include at least 105 adits with more than 25,600 ft of underground workings, 27 shafts, and 113 pits, trenches, and open cuts (Kuizon and Lipton, 1989). Some of the sites have been explored by drilling; 5,000 ft of diamond drilling was done at the Johnson prospect in 1952 (Ross, 1963, p. 251). The tailings and dumps at the Wilbert mine were reworked for lead and silver between 1945 and 1960; the remaining material is essentially barren (Kuizon and

Lipton, 1989). The most recent activity in the district was the mining of small, high-grade pockets of silver, lead, zinc, and copper ore at the Great Western mine in 1986 and 1987.

Other areas

Uranium and vanadium occurrences have been explored in the drainage of the North Fork Big Lost River. Shears and fault zones in clastic rocks of the Copper Basin Formation at the Bartlett Creek (526) and Sweets Park Canyon (524) prospects contain torbernite, autunite, and small amounts of pitchblende in a gangue of limonite, quartz, and barite. The Sweets Park Canyon prospect was drilled by Exxon Minerals in 1979; adits were driven and drilling was done at the Bartlett Creek prospect by Homestake-Wyoming Partners in 1973 and by Rocky Mountain Energy Company between 1977 and 1982. No commercially viable deposits were found.

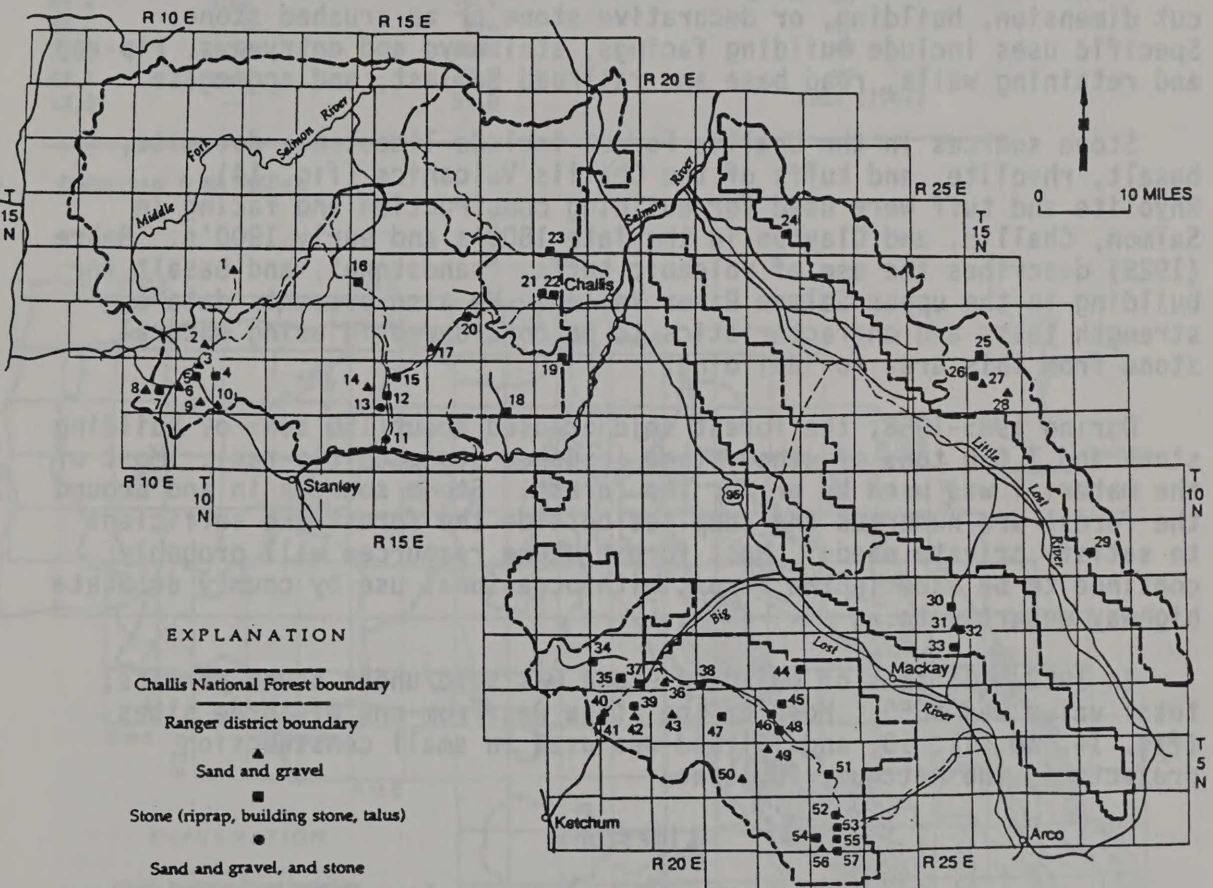
Westmont Minerals, Inc. Spokane, WA, was exploring for a stratabound silver-lead-zinc deposit (529) in the drainage of North Fork Big Lost River in 1987-88. Soil surveys and drilling have revealed favorable mineralization; exploration is expected to continue in 1989.

In the west central part of the Lost River Range north of Mackay, ID, irregular replacement zones at four localities (620, 625, 627, and 629) may have produced small amounts of silver, lead, and zinc. The zones are along shears or bedding planes in Paleozoic quartzite and dolomite. None have had recent activity. Barite and silica have also been found in the Lost River Range (622, and 634) but market conditions have thus far precluded development.

In the Lemhi Range, small amounts of copper and silver were produced from the Copper Bluff mine (651) in Bassinger Canyon between 1932 and 1951. Iron replacement deposits near Foss Mountain, at the Bellview mine (654) and Iron Cap (655) are along bedding plane and related shears in dolomite. Small amounts of iron and manganese have been produced and a small subeconomic iron resource remains (Kuizon and Lipton, 1989). The Copper Mountain mine (677), near the head of Uncle Ike Creek, produced small amounts of copper and silver between 1941 and 1955; underground workings are caved. Near the head of Mormon Gulch, the Whitebird (679) and Bighorn mines (680) produced lead, silver, and small amounts of gold from shear zones along limestone-shale contacts. Identified resources totalling 3,500 tons at the two mines contain lead, zinc, and silver. Miscellaneous prospects at the southern end of the range in the Black Canyon area have anomalous amounts of lead, silver, zinc, and copper, but no substantial mineralized structures have been identified.

Saleable Minerals

Saleable mineral materials in the forest include sand and gravel, stone (dimension, crushed, decorative, and rip-rap), and limestone, and dolomite. Numbered occurrences of each material site shown in figure 14 are individually summarized in table 15 at the end of this section.


R 10 E
R 15 E
R 20 E
R 25 E
T 15 N
T 10 N
T 5 N
0 10 MILES
Middle Fork Salmon River
Salmon River
Little Lost River
Big Lost River
Challis
Stanley
Mackay
Ketchum
Arco
93
1
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EXPLANATION
Challis National Forest boundary
Ranger district boundary
▲ Sand and gravel
■ Stone (riprap, building stone, talus)
● Sand and gravel, and stone

FIGURE 14.--Saleable mineral locations in the Challis National Forest.

Sand and Gravel

Sand and gravel occur along major rivers and streams in the forest. As in most other areas, this is the mineral commodity with the highest production in the forest. Forest Service records indicate that approximately 71,000 tons (value at the time of use about $23,000) of sand and gravel were sold or used by the Challis National Forest during 1985-1988. Most of this material was used by the Forest Service. Sand and gravel, being of low unit value are usually sought in deposits near their end use. For this reason deposits within the forest will probably continue to be used in the forest. Some free-use by county and State highway departments will continue. Sand and gravel resources are readily available outside the forest for private projects.

Stone

Stone is a broad category of rock used in its natural state or as cut dimension, building, or decorative stone or as crushed stone. Specific uses include building facings, stairways and entryways, rip-rap and retaining walls, road base and railroad ballast, and aggregate.

Stone sources in the Challis Forest include limestone, dolomite, basalt, rhyolite, and tuffs of the Challis Volcanics (fig. 14). Rhyolite and tuff were used for building construction and facing in Salmon, Challis, and Clayton in the late 1800's and early 1900's. Behre (1929) describes the use of volcanic tuffs, "sandstone", and basalt for building in the upper Salmon River Valley. He also presents data on strength tests and characteristics to be considered in using natural stone from this area for building.

During 1985-1988, the forest sold or used about 150 tons of building stone and 7,650 tons of other stone (crushed stone or rip-rap). Most of the material was used by or for the forest. Stone sources in and around the forest are numerous and supplies outside the forest are sufficient to satisfy private needs. Most forest stone resources will probably continue to be used in the forest with occasional use by county or State highway departments.

In 1988, 135 tons of building stone was sold under seven permits; total value was $650. Most of the stone was from one of three sites (fig. 14, no. 11, 18, and 19) and was used in small construction projects in the Ketchum, ID, area.

Limestone

Limestone is abundant in the forest, particularly in the Lost River Range and the Lemhi Range (fig. 15). Uses for limestone are numerous and varied, the most common of which are crushed stone for fill or roadbed construction, portland cement, sugar refining, filler in paper and paint, flux in metal smelting, and agriculture.

Limestone is exposed over approximately 350 mi^2 of the forest and may underlie much of the Challis Volcanics in the remainder of the forest. The principle limestone unit in the forest is the White Knob (Brazer) Limestone, which has an estimated thickness of 4,000 ft and is described by Savage (1969) as a "pure limestone". Analyses by Savage (1969) and by Ross (1947) of rocks from this unit are listed in the following table.

White Knob Limestone analyses
[--, not determined]

$CaCO_3$ (%)	MgO[1] (%)	Contaminants (%)	Source
74.6	0.53	22.0	Savage (1969)
84.9	2.73	10.8	do
84.0	3.30	7.3	do
81.4	0.62	16.4	do
90.4	1.10	6.4	do
72.0	0.72	20.0	do
67.4	0.62	29.5	do
47.0	--	51.0	Ross (1947)

[1] Converted from $MgCO_3$

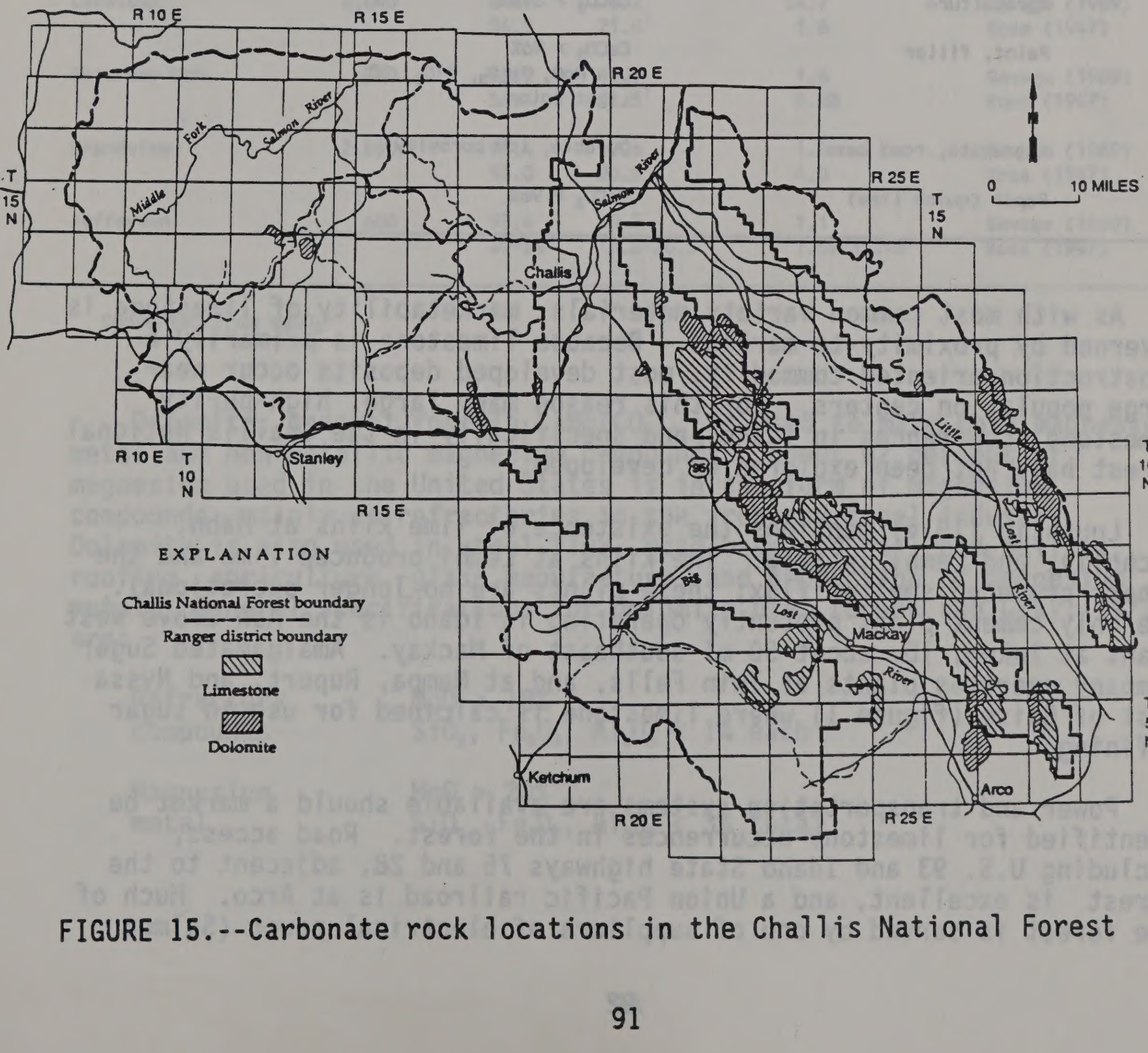
R 10 E
R 15 E
R 20 E
R 25 E
T 15 N
T 10 N
T 5 N
Middle Fork Salmon River
Salmon River
Challis
Stanley
Ketchum
Mackay
Arco
Little Lost River
Big Lost River
93
N
0
10 MILES
EXPLANATION
Challis National Forest boundary
Ranger district boundary
Limestone
Dolomite

FIGURE 15.--Carbonate rock locations in the Challis National Forest

Compositional specifications for various applications of limestone are tabulated below. Data are from Bowen and Gray (1973).

Limestone compositional requirements, by use categories

Application	Specification
Portland cement	MgO < 3% Total alkali < 0.5% $CaCO_3$ > 82%
Lime	$CaCO_3$ > 97%
Steel flux	
-open hearth	$CaCO_3$ > 96%
-blast furnace	SiO_2 < 5% Al_2O_3 < 2% MgO < (4-0.15%)
Beet sugar	SiO_2 < 1% MgO < 4% (Fe_2O_3 < 0.5%)
Agriculture	$CaCO_3$ > 85%
Paint, filler	$CaCO_3$ > 96% Low MgO, Fe_2O_3, SiO_2, SO_2 Light color
Aggregate, road base	Durable, low porosity
Paper (quick lime)	$CaCO_3$ > 96%

As with most common variety materials, marketability of limestone is governed by proximity to markets. Because limestone is primarily a construction-oriented commodity, most developed deposits occur near large population centers. For this reason many large, high-purity limestone occurrences in Idaho, and specifically in the Challis National Forest have not been explored or developed.

Loughlin (1914) mentions the existence of lime kilns at Hahn, Nicholia, and Lemhi in 1913. The kilns at Lemhi produced lime and the others produced smelter flux; these plants are no longer operational. The only cement plant presently operating in Idaho is the Ash Grove West plant at Inkom, ID, about 50 mi southeast of Mackay. Amalgamated Sugar Company operates plants at Twin Falls, and at Nampa, Rupert, and Nyssa west of Boise (figure 1) where limestone is calcined for use in sugar refining.

Power and transportation systems are available should a market be identified for limestone occurrences in the forest. Road access, including U.S. 93 and Idaho State highways 75 and 28, adjacent to the forest is excellent, and a Union Pacific railroad is at Arco. Much of the forest is served by one of suppliers of electrical power (Salmon

River Electric Coop., Lost River Electric Coop., or Idaho Power Company). Although large amounts of high-purity limestone exist in the forest, and transportation and power services are available, development is unlikely in the near future except for small deposits of high durability (resistant to abrasion) limestone that may be used for road fill or aggregate.

Dolomite

Dolomite that meets general metallurgical requirements occurs in four formations that are exposed over nearly 150 mi^2 in the Challis Forest (fig. 15). These formations also extend in places beneath a cover of Challis Volcanic rocks. Their estimated thicknesses and available analyses are:

Dolomite formations

Formation	Thickness (ft)	$CaCO_3$ (%)	MgO (%)	SiO_2 (%)	Source
Laketown	6,000	64.6	3.2	24.7	Savage (1969)
		54.0	21.0[1]	1.6	Ross (1947)
Saturday Mtn.	700	58.9	18.9	1.6	Savage (1969)
		54.1	21.5[1]	0.88	Ross (1947)
Grandview	2,000	97.4	0.6	1.0	Savage (1969)
		53.0	20.5[1]	4.0	Ross (1947)
Jefferson	600	97.4	0.5	1.1	Savage (1969)
		49-54	18.6-20.5[1]	1.89-11.48	Ross (1947)

[1] Converted from $MgCO_3$

Dolomite, general formula $CaMg(CO_3)_2$, is used to make both magnesium metal and non-metallic magnesium compounds. About 82 percent of magnesium used in the United States is in the form of magnesium compounds, mainly as refractories in the iron and steel industry. Dolomite is also used in steel flux, road base and railroad ballast, roofing, agriculture, glass manufacture, and production of magnesium metal. General specifications for dolomite uses (Bowen and Gray, 1973) are:

Refractory compounds	MgO > 18% SiO_2, Fe_2O_3, Al_2O_3 < 1% each
Magnesium metal	MgO > 20% SiO_2, Fe_2O_3, Al_2O_3 < 3% total

The composition of dolomitic rocks in the Challis National Forest is variable, but very large tonnages are likely available within the forest should market conditions make development feasible (Capstick 1987, p. 14). A thorough examination of any one material source would be necessary to determine actual suitability. The Northwest Alloys Co. plant at Addy, WA, is presently the only U.S. producer of magnesium metal from dolomite. Feed stock at that plant contains 21.3 percent magnesia (MgO) and 1.63 percent insoluble contaminants (SiO_2, Al_2O_3, Fe_2O_3). Dolomite with similar composition occurs in the forest.

Table 15.--Mineral material sites in the Challis National Forest
[NA, not available]

Map No. (fig. 22)	Site (Location)	Type	Rock Type	Size (yd^3)
1	Junction of Seafoam and Vanity Creeks (T14N, R11E, sec. 13)	Sand and gravel	Granitic	74
2	North Beaver Creek (T13N, R11E, sec. 25)	Sand and gravel	Granitic	NA
3	South Beaver Creek (T12N, R11E, sec. 1,2)	Sand and gravel	Granitic, volcanic	22,223
4	Asher Creek (T12N, R12E, sec. 7)	Talus, rap	Volcanic (welded tuff)	10,000
5	Bradley Memorial Scout Camp (T12N, R11E, sec. 2,11)	Talus, rap	Granitic	18,519
6	Banner Creek (T12N, R11E, sec. 16)	Sand and gravel	Granitic	NA
7	Cape Horn Creek East (T12N, R10E, sec. 23)	Talus, rap	Granitic	23,333
8	Cape Horn Creek West (T12N, R10E, sec. 21,23)	Sand and gravel	Granitic, some volcanic	166,667
9	Vader Creek (T12N, R11E, sec. 25)	Sand and gravel, road fill	Granitic	NA
10	Trap Creek area (T12N, R12E, sec. 32)	Sand and gravel	Granitic, some volcanic	NA
11	Junction Blind Creek and Yankee Fork (T11N, R15E, sec. 17)	Dredge tailings, sand and gravel, rap	Granitic, volcanic	38,519
12	Preachers Cove area (T12N, R11E, sec. 20)	Talus, road fill, surfacing	Volcanic	1,250
13	West Fork Yankee Fork (T12N, R11E, sec. 20,29)	Dredge tailings, sand and gravel, rap	Granitic, some volcanic	13,889
14	West Fork Yankee Fork (T12N, T14E, sec. 13)	Colluvium, talus, road surfacing	Volcanic	111,200
15	Custer site (T12N, R15E, sec. 9)	Talus	Volcanic	11,200
16	West Fork Mayfield Creek (T14N, R14E, sec. 23)	Talus	Volcanic	NA

Table 15.--Mineral material sites in the Challis National Forest--Continued

Map No. (fig. 22)	Site (Location)	Type	Rock Type	Size (yd^3)
17	Eight Mile Creek (T13N, R16E, sec. 30)	Sand and gravel, road surfacing, fill	Granitic, volcanic	NA
18	Squaw Creek (T12N, R17E, sec. 33)	Talus, rap, building stone	Quartzite, slate	30,000
19	Bayhorse Creek (T12N, R18E, sec. 4)	Talus, rap, road fill, building stone	Slate	80,000
20	McKay Creek (T13N, R16E, sec. 2)	Talus	Volcanic	NA
21	Mill Creek (T14N, R18E, sec. 30)	Talus, building stone	Volcanic	3,000
22	Mill Creek (T14N, R18E, sec. 29)	Talus, road surfacing	Volcanic	3,000
23	White Valley Creek (T15N, R18E, sec. 32)	Talus, road surfacing, fill	Volcanic (welded tuff)	4,300
24	Morse Creek (T15N, R22E, sec. 23)	Talus, road surfacing, fill, rap	Volcanic (blocky)	30,000
25	Timber Creek (T13N, R26E, sec. 31)	Talus	Granitic, volcanic	100
26	Jackson Creek (T12N, R26E, sec. 7)	Talus	Volcanic	75
27	Bull Creek (T12N, R26E, sec. 17)	Sand and gravel, road fill	Quartzite, volcanic	175
28	Squaw Creek (T12N, R26E, sec. 23)	Sand and gravel, road surfacing, fill	Quartzite	31,250
29	Badger Creek (T9N, R28E, sec. 20)	Talus, rap	Quartzite	NA
30	Wet Creek (T8N, R25E, sec. 15)	Talus	Silicified shale	150
31	Bear Creek (T8N, R25E, sec. 35)	Talus	Limestone	5,600
32	Mud Lake Canyon (T8N, R25E, sec. 35)	Talus, road surfacing, fill	Silicified shale	225

Table 15.--Mineral material sites in the Challis National Forest--Continued

Map No. (fig. 22)	Site (Location)	Type	Rock Type	Size (yd^3)
33	Blue Jay Canyon (T7N, R25E, sec. 11)	Talus, road surfacing, fill	Limestone	150
34	Slide Canyon (T7N, R19E, sec. 18)	Talus, rap	Volcanic	200
35	Jim Canyon (T7N, R19E, sec. 27)	Talus	Volcanic	NA
36	Junction Wildhorse Creek and East Fork Big Lost River (T7N, R20E, sec. 33)	Sand and gravel, rap	Granitic	8,000
37	Trail Creek road and North Fork Big Lost River (T7N, R19E, sec. 36)	Talus, road surfacing, fill	Volcanic	600
38	Pole Creek and East Fork Big Lost River (T7N, R21E, sec. 31)	Sand and gravel	Granitic and volcanic	NA
39	Kane Creek (T6N, R19E, sec. 11)	Talus	Volcanic	NA
40	Big Fall Creek and Trail Creek road (T6N, R19E, sec. 18)	Sand and gravel, road surfacing, fill	Granitic, volcanic	1,100
41	Little Fall Creek and Trail Creek road (T6N, R19E, sec. 18)	Talus, rap, building stone	Volcanic (welded tuff)	2,100
42	Junction of Kane Creek and Little Kane Creek (T6N, R19E, sec. 14)	Sand and gravel, road surfacing, fill	Granitic volcanic	1,000
43	Wildhorse Creek and Fall Creek (T6N, R20E, sec. 16)	Sand and gravel, road surfacing, fill	Quartzite argillite	6,000,000
44	Burma road (T7N, R22E, sec. 24)	Talus, road surfacing, fill	Volcanic (rhyolite)	185
45	Corral Creek (T6N, R22E, sec. 10)	Talus, road surfacing, fill	Granitic volcanic	334
46	Cabin Creek (T6N, R22E, sec. 16)	Talus, road surfacing	Volcanic (rhyolite)	NA
47	East Fork Big Lost River (T6N, R21E, sec. 17)	Talus, rap	Volcanic (rhyolite)	NA

Table 15.--Mineral material sites in the Challis National Forest--Continued

Map No. (fig. 22)	Site (Location)	Type	Rock Type	Size (yd^3)
48	Copper Basin Guard Station (T6N, R22E, sec. 28)	Talus, road fill	Volcanic (rhyolite)	NA
49	Copper Basin road (T5N, R22E, sec. 5)	Sand and gravel, road surfacing	Volcanic, some granitic	741
50	Copper Basin road loop (T5N, R21E, sec. 23)	Sand and gravel, road surfacing, fill	Volcanic, some granitic	6,250
51	Larkspur Canyon (T5N, R23E, sec. 21)	Talus, road surfacing	Volcanic (tuff)	40
52	Coyote Canyon (T4N, R23E, sec. 10)	Talus, road surfacing, fill	Volcanic (welded tuff)	13,889
53	Junction Dry Canyon and Antelope road (T4N, R23E, sec. 22)	Talus, rap	Volcanic (welded tuff)	NA
54	Junction Right and Left Forks Iron Bog Creek (T4N, R23E, sec. 30)	Talus, road surfacing, fill	Volcanic (welded tuff)	1,111
55	Marcroft Canyon and Antelope Creek (T4N, R23E, sec. 27)	Talus, road surfacing, fill	Volcanic (rhyolite)	1,700
56	Iron Bog Creek (T4N, R23E, sec. 32)	Talus, road surfacing, fill	Volcanic (welded tuff)	60
57	Junction Iron Bog Creek and Antelope Creek (T4N, R23E, sec. 33)	Sand and gravel, road surfacing, fill	Volcanic (welded tuff, rhyolite)	2,300

MINE DEVELOPMENT COSTS

Representative mining, milling, and infrastructure capital and operating costs for the types and sizes of deposits likely to be developed on the Challis National Forest are shown in the following tables. Capital costs include all expenses incurred to bring the operation to its designed production capacity; these costs represent the investment that must be made before any return can be realized. Operating costs include expenses incurred to keep the project operating at its designed capacity, on a per-ton basis. Appendix B contains guidelines and formulas for selecting mining method, determining optimum mining rates, and estimating mining and beneficiation costs.

Costs associated with pre-operational permitting (environmental assessments, base line studies, delays that result from legal challenges) are not included. None of these costs consider taxes, which are part of a financial analysis. These cost estimates assume that the operator is a professional mining concern using new equipment, paying standard wages, and expecting normal profits. Operators that already have equipment or are self-employed, especially at small operations, may be able to substantially reduce these costs and therefore realize a profit when a larger company could not.

These costs are first approximations as of July 1988; more precise estimates can be made through use of CES (Cost Estimating System) (U.S. Bureau of Mines, 1987a, b). These costs are in metric units, intended to simplify refinement or comparison of the estimates through CES. Conversion factors are given on p. *vii*, following the Contents section of this report.

Mineral deposit types identified on the Challis National Forest may be mineable by surface or underground methods. For near-surface deposits that are massive, thick-bedded, or flat-lying and tabular, open-pit mining can be used. Such deposits include the gold disseminations and stockworks at the Sunbeam mine and the disseminated molybdenum deposit at the Cyprus-Thompson Creek mine. Estimated costs to mine such a deposit range from $8.91 million to $29.87 million in capital costs for a 1,000 mt/day to 20,000 mt/day operation and $10.73/mt to $2.98/mt in operating costs (table 16).

For thin, steeply dipping, or deeply buried deposits, underground mining methods must be used. For underground mines likely to be developed on the Challis National Forest, capital costs can be expected to range from $2.36 million for a 50 mt/day shrinkage stope mine with adit access to $103.2 million for a 20,000 mt/day cut and fill mine with shaft entry. Operating costs for underground would likely range from less than $7/mt for a large operation, to more than $120/mt for a small operation.

Table 16.--Estimated mining costs for deposits likely to be developed in the Challis National Forest 1/
[NA, not applicable]

Deposit size Daily capacity	53,000 mt (50 mt/d)		130,000 mt (100 mt/d)		3,000,000 mt (1,000 mt/d)		60,000,000 mt (10,000 mt/d)		160,000,000 mt (20,000 mt/d)	
Mining Method	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)
Open Pit	NA	NA	NA	NA	8.91	10.73	25.95	5.37	29.87	2.98
Room and pillar										
Adit	2.55	20.97	3.59	18.55	11.89	12.24	37.58	8.35	54.85	7.39
Shaft	10.34	22.55	11.37	20.13	19.67	13.82	45.36	9.93	63.62	8.97
Cut and fill										
Adit	3.92	122.62	5.54	98.27	19.80	46.40	63.66	23.47	95.41	18.93
Shaft	11.70	124.20	13.33	99.85	27.59	47.58	71.45	25.05	103.20	20.51
Vertical Crater Retreat										
Adit	NA	NA	NA	NA	12.86	13.46	56.89	8.51	92.69	7.44
Shaft	NA	NA	NA	NA	20.64	15.04	64.67	10.09	100.47	9.02
Shrinkage stope										
Adit	2.36	39.34	3.43	31.97	12.73	15.77	44.68	8.30	67.47	6.77
Shaft	10.14	40.92	11.21	33.55	20.52	17.35	52.47	9.88	75.26	8.35
Placers	NA	NA	0.14	14.60	0.35	7.16	0.83	3.62	NA	NA

1/ July 1988

Ore from deposits likely to be mined on the Challis National Forest will ordinarily require beneficiation (milling) before final products can be sold to a refiner, smelter, or end user. Milling will likely involve leaching, gravity concentration, or flotation; ore characteristics and commodities involved will determine which methods are applicable. Capital costs range from about $1 million for a 50 mt/day flotation mill to more than $130 million for a 20,000 mt/day carbon-in-pulp leach plant (table 17). Operating costs range from more than $50/mt (small operation) to less than $3/mt (large operation).

Table 17.--Estimated milling costs for deposits likely to be developed on the Challis National Forest 1/

[NA, not applicable]

Deposit size Daily capacity	53,000 mt (50 mt/d)		130,000 mt (100 mt/d)		3,000,000 mt (1,000 mt/d)		60,000,000 mt (10,000 mt/d)		160,000,000 mt (20,000 mt/d)	
Milling Method	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)
Carbon-in pulp leach	2.57	52.10	4.05	36.40	18.46	11.79	84.75	4.48	134.62	3.50
Heap leach	NA	NA	0.46	17.57	3.62	7.39	28.64	3.15	53.49	2.45
Tungsten oxide Gravity	1.37	29.41	1.98	22.71	NA	NA	NA	NA	NA	NA
Flotation	NA	NA	NA	NA	9.79	14.39	NA	NA	NA	NA
One-product flotation	NA	NA	NA	NA	8.79	6.25	52.44	2.70	90.00	2.60
Lead-zinc flotation	1.01	32.91	1.74	22.88	10.69	7.47	66.72	2.96	116.02	2.34
Polymetallic sulfide flotation	1.09	29.66	1.88	20.58	11.46	7.49	64.77	3.16	NA	NA
Placer (gravity)	NA	NA	NA	NA	0.27	1.27	0.56	0.79	0.71	0.68

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For remote sites, the construction and maintenance of access roads, camp facilities, and on-site power generation facilities can add substantially to the cost of a mining operation. For sites near small communities, additional costs can be anticipated for impacts on such things as subsidized housing, water supplies, and prepayment of taxes for schools. Table 18 shows associated infrastructure costs for such sites.

Table 18.--Estimated infrastructure costs for deposits likely to be developed in the Challis National Forest 1/
[NA, not applicable]

Deposit size Daily capacity	53,000 mt (50 mt/d)		130,000 mt (100 mt/d)		3,000,000 mt (1,000 mt/d)		60,000,000 mt (10,000 mt/d)		160,000,000 mt (20,000 mt/d)	
Operation Type	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)	Capital Cost (MM$)	Operating Cost ($/mt)
Surface Mine	4.03	23.43	5.52	16.70	15.89	5.80	46.36	2.22	64.14	1.69
Small Underground Mine	5.47	26.54	7.80	19.22	25.99	6.78	NA	NA	NA	NA
Large Underground Mine	NA	NA	NA	NA	NA	NA	70.53	2.90	100.66	2.17

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MINERAL ECONOMICS

A summary of production and consumption data for those commodities that occur within the forest is presented in appendix C. Commodities reported to occur within the forest are listed below and those which have been identified as strategic and critical to national priorities are underlined. For commodities that have been produced or that have been identified in resources within the Challis National Forest, a discussion of market conditions and economic factors likely to affect future development is presented in this section.

Commodities of the Challis National Forest
[underlined commodities are strategic and critical]

Antimony
Arsenic
Barite
Beryllium
Bismuth
Cobalt
Copper
Fluorspar
Garnet
Gold
Graphite
Ilmenite
Iron ore
Lead
Lime

Manganese
Mercury
Molybdenum
Nickel
Rare-earth elements
Sand and gravel
Silicon
Silver
Stone (dimension)
Titanium
Tungsten
Uranium
Vanadium
Zeolites
Zinc
Zirconium

Minerals and materials which are identified as strategic or critical by the U.S. Government are defined as those: (1) necessary to supply military, industrial, and essential civilian needs during a national defense emergency, and (2) not found or produced in the United States in sufficient quantities to meet emergency needs. Some factors which indicate criticality are: (1) adequacy of production capacity and supporting domestic reserves, (2) substitution and recycling possibilities, and (3) degree of import dependency and wartime vulnerability.

Molybdenum

At current (1989 average) prices, molybdenum has the highest past production value (about $241 million; $3.65/lb Mo) and the highest identified resource value (about $1 billion) within the Challis National Forest. All of the molybdenum production and nearly all of the identified molybdenum resources within the forest are attributable to one mine, the Thompson Creek molybdenum mine. This is one of four primary molybdenum producers in the United States. Production at the domestic primary molybdenum mines increases and decreases directly with changing economic conditions. Increased copper prices also result in increased byproduct molybdenum production as domestic copper mines increase production levels. The development of domestic molybdenum resources has positioned the United States as a net exporter of molybdenum. Because domestic mines with large, identified, reserves have excess productive capacity that can be quickly brought on-line when prices increase, the development of new molybdenum resources on the Challis National Forest in the near future is unlikely. Higher molybdenum prices, reduced electric power rates, and a re-imposed tariff on Chilean molybdenum enabled Cyprus Minerals Co. to increase production at the Thompson Creek molybdenum mine in 1988. Cyprus added 138 employees and increased its 1988 production goal from 3.5 million to 10 million pounds of molybdenum. Based on identified reserves, production from the Thompson Creek molybdenum mine is expected to continue at varying levels at least through the year 2013.

Fluorspar

Fluorspar from the Challis National Forest accounts for about $125,000 in production value (acid-grade fluorspar at $173/ton) and about $240 million in resource value, second only to molybdenum. Past production came from a small, vein-type fluorspar deposit in the Garden Creek area. The identified resources occur primarily at one location, the Pacific mine in the Bayhorse mining district. Development of the Pacific mine for fluorspar will require construction of a flotation milling facility to beneficiate the relatively low-grade, breccia-manto-type deposit. Scattered small, high-grade fluorspar veins elsewhere in the forest are not likely to be developed due to the high cost of mining these small deposits and high freight costs to end-user locations, primarily on the east coast of the United States.

Most of the fluorspar consumed in the United States goes into aluminum processing, steelmaking, fluorocarbons, uranium processing, and other manufacturing and industrial uses. The effect of efforts to reduce the use of CFC's (chlorofluorocarbons), aimed at lessening ozone depletion, on fluorine consumption is uncertain. The demand for fluorine may actually increase since some alternative CFC's contain more fluorine than do the CFC's currently used. The United States relies on foreign imports for about 90 percent of its fluorspar. Price competition from foreign sources is the main reason that domestic fluorspar resources are not currently being produced. In the event of a disruption of supply from major foreign suppliers (Mexico and South Africa), and as higher grade domestic resources are depleted, the fluorspar resources at the Pacific mine may be a future source for domestic needs.

Gold

The value of past gold production from the forest (about $70 million; $385/oz gold) is largely attributable to the rich vein deposits in the Yankee Fork mining district. However significant new reserves at the Sunbeam mine and other properties in the Yankee Fork mining district indicate the increased interest in exploration for low-grade gold deposits in the Challis Volcanics, especially along the Trans-Challis fault system. Similar, near-surface gold deposits have been identified or are the subject of exploration in the Dynamite Creek area (within the Frank Church-River of No Return Wilderness), and at Parker Mountain, Estes Mountain, Red Mountain, Sheep Mountain, and Copper Basin. Continued activity at these and other locations in similar geologic terranes within the forest should be expected.

The overall level of gold exploration in Idaho, as well as the rest of the Western United States, continues to be high. Gold is currently the most highly sought commodity in the United States. The price of gold has remained well above the average mining cost since 1980, providing a strong incentive to explore for gold. Gold prices weakened during 1989, which is evidence that the pattern of dramatically rising gold prices in the face of international tension and rising oil prices may be changing. Expectations are for gold prices to remain near the $400/oz level in 1990; despite the continued softening of prices, interest in low-grade, high-tonnage, low-cost, surface-mineable gold deposits will likely remain high. Pending Federal and State regulations regarding cyanide use and mine-tailings effluents are expected to increase operating and reclamation costs of mining operations in Idaho in coming years.

Silver

Silver has the second highest production value from the forest (about $133 million; $5.55/oz silver), behind molybdenum. Much of the silver production also came from the rich vein deposits of the Yankee Fork mining district. These vein-type deposits were exposed or near surface, but ore did not extend to great depth. At Grouse Creek, CoCa Mines Inc. has plans to develop a deposit containing an estimated 8.6 million oz of silver and 1.5 million oz of gold, with production scheduled in 1992. Elsewhere in the forest, substantial silver resources occur with base metals in stratabound deposits at the Phi Kappa mine, Alta mining district. The purpose of ongoing development activity at the Greyhound mine, Seafoam mining district, is to verify and expand identified silver resources. Exploration aimed at identifying new silver resources is currently under way along the North Fork of the Big Lost River and at other locations in the forest.

Significant silver reserves remain at mines in the Coeur d'Alene mining district in northern Idaho. Many of these mines are currently idle or operating below capacity due to low silver prices. Silver prices are expected to remain near the average 1989 level of $5.55/oz, due to large inventories and price competition from foreign producers which currently export silver to the United States. Despite depressed silver prices, exploration for silver and gold in Idaho continued an upward trend in 1989, and is expected to remain high. The number of major companies actively exploring for precious metals in the State increased in 1989.

Lead and Zinc

Lead and zinc occur together in the forest, primarily as bedded sulfide deposits and fissure veins and replacements in carbonate and underlying granitic rocks. Mines in the Seafoam, Bayhorse, Alta, Alder Creek, Badger Creek, and Dome mining districts have been major lead-zinc producers in the past. Total production accounts for more than $35 million in value ($0.40/lb lead and $0.83/lb zinc). Significant lead and zinc resources occur in association with silver at the Phi Kappa and Greyhound mines, an association that is common throughout the forest. Total identified resources have a value of more than $170 million. Increased exploration and development activity in the Coeur d'Alene silver-lead-zinc district of northern Idaho is largely a response to recent price increases in lead and zinc (from $0.22/lb lead and $0.38/lb zinc in 1986). Prices at current levels may make feasible the reopening of past producers in the Challis National Forest where resources remain. Because lead and zinc deposits in the forest are closely associated with silver, a price increase for any one of these metals may lead to renewed production of all three. Under-investment in zinc mines and refineries and increased zinc consumption in recent years suggest that zinc prices may remain high.

Copper

Copper production values from the forest (about $96 million; $1.32/lb copper) came primarily from polymetallic skarns and fissure veins and replacements in the Alder Creek, Loon Creek, Badger Creek, Bayhorse, and Yankee Fork mining districts. In the Alder Creek and Badger Creek mining districts, production was from primary copper mines. In the other areas, copper production was primarily byproduct production from precious and base metal mines.

The value of identified copper resources in the forest (about $67 million) is mainly in the Alder Creek mining district. New leaching methods, such as the in-situ methods currently being tested by the USBM in Arizona, may allow the development of oxidized copper resources in the Alder Creek mining district. Future copper production in other parts of the forest are likely to be as a byproduct of mining precious and base-metal deposits. Copper production by traditional open pit operations continued to make a strong comeback in 1989, and new projects using solution mining techniques were begun or continued at several locations in the United States. Domestic copper production increased significantly in 1989, resulting in a decrease in the import reliance to 9 percent, the lowest in six years. Because of depleted stockpiles, copper prices are expected to remain relatively high for the near future.

Tungsten

Import agreements with major foreign suppliers of tungsten, primarily China, have made production of domestic tungsten resources uneconomic. The United States relies heavily on these imports for supply to domestic processing facilities, which is strategic and critical to maintaining domestic tungsten processing capacity. In the event of a disruption of foreign supplies, existing domestic resources will provide a source for domestic consumption. Exploration for undiscovered tungsten resources is not expected unless supply situations call for the production of known domestic resources during times of critical need.

Although currently uneconomic, tungsten resources are identified at several locations on the Challis National Forest. The Thompson Creek Tungsten mine (Scheelite Jim) in Thompson Creek has identified resources remaining in a deposit which had recorded production during the years 1954 to 1960. Tungsten resources also occur at the Ima mine, which was one of Idaho's leading tungsten producers from 1934 to 1958, and at the Springfield Scheelite mine, which produced from 1953 to 1955. Low grade resources have also been identified in the Wildhorse Creek area.

Uranium

For the past several years, domestic uranium exploration and development activities have been generally confined to known mineralized areas, primarily in Wyoming and Texas. These areas contain substantial identified reserves at operating mines as well as undeveloped sites. Mining by conventional mining and milling methods continued, and several operations using in-situ leaching technology were brought into production in 1987 and 1988.

In the Stanley Basin area, uranium was produced and sold to the U.S. Government during times of critical national need. At that time, the government offered a price high enough to make the mining of smaller deposits possible. Production from these deposits could not be sustained under free market prices. The resources in the Stanley Basin area and the small uranium prospects along the Middle Fork Salmon River and the North Fork Big Lost River, which occur in small veins or carbonaceous replacements in sedimentary rocks, are not of sufficient size or grade to be of significance when compared to existing large-tonnage deposits in other States.

Antimony

In 1989, China was the major supplier of antimony products, supplying about 60% of U.S. imported ores, metal, and oxide. Production from domestic source materials was largely derived from recycling of lead-antimony batteries. Recycling plus U.S. mine output, which represented a minor tonnage, supplied about one-half of domestic needs. Primary antimony metal and oxide were produced by six U.S. companies, which operated plants using both foreign and domestic material. The trend for imports to supply the majority of domestic consumption of primary antimony should continue for the short term.

Iron Ore

Identified iron ore resources are in the Alder Creek mining district and in smaller occurrences of iron and manganese in the Lemhi Range. Currently, large domestic iron ore resources and active processing facilities are centered in the Great Lakes area, near the steel producing districts in the eastern United States. Reserves in the Eastern States are sufficient to supply domestic needs, therefore development of iron resources in the western States is unlikely in the foreseeable future.

Manganese

Domestic manganese production has been subsidized by the U.S. Government during times of critical need. The United States currently relies on foreign sources for all manganese supplies. During times of critical need, small manganese deposits in the forest may be developed for strategic and critical national needs.

Heavy Minerals

Garnet, zircon, and ilmenite resources occur as heavy mineral constituents of black-sand placer deposits in the Kelly Creek-Stanley Creek area. Garnet, zirconium (contained in zircon), and titanium (contained in ilmenite) each have industrial uses. In addition to these minerals, black-sand deposits commonly contain rare-earth-bearing minerals and radioactive elements in the minerals monazite and zircon. Black-sand deposits are not likely to be exploited for a single commodity. Although these deposits commonly contain rare-earth elements in monazite, the radioactive thorium content of monazite creates tailings disposal problems for processing of these black-sand deposits. The potential for environmental contamination from disposed tailings at placer processing facilities will continue to be a major drawback to the development of this type of deposit.

LANDS AVAILABLE FOR MINING

One objective of the Challis National Forest is to manage minerals in accordance with multiple-use principles, and to integrate the exploration, development, and production of mineral and energy resources with the use, conservation, and protection of other resources. An analysis of restrictions on mineral development for lands administered by the Challis National Forest is shown in table 19.

Table 19.--Availability to mining of lands administered by the Challis National Forest
[land status as of October 1987]

Restriction category	Area (acres)	Percent of forest	Lands involved
Available, multiple-use	935,000	37.1	All open, unappropriated land and reconveyed land for which "an open to entry" notification has been issued.
Management restricted, slight severity	545,000	21.6	Identified visual resource or semi-primitive unroaded areas, scenic travel routes, and big game or other habitats.
Legally restricted, moderate severity	2,000	0.1	Mainly power-site classifications.
Management unavailable, severely restricted	232,000	9.2	Municipal watersheds, administrative sites, semi-primitive unroaded areas, special resource protection areas, and areas identified for potential wilderness designation.
Legally unavailable	807,000	32.0	Frank Church-River of No Return Wilderness, recreation and other administrative sites, power project withdrawals, wild and scenic river corridor along the Middle Fork of the Salmon River.

These data are part of a comprehensive assessment of land-use restraints compiled for the State of Idaho by USBM (Hyndman, 1989). Substantial portions of the lands administered by the Challis National Forest have been set aside (withdrawn) legally, or managed in a way that restricts mineral exploration and development. In general, restrictions have arisen through numerous laws, regulations, policies, and management practices which were implemented to preserve or protect a variety of nonmineral resource values. Since Federal lands are a vital source of minerals for the Nation, it is important to identify restrictions which limit access to, and development of mineral resources on public lands to ensure its many resources are managed in the public interest.

Restriction categories, intended to indicate the practical effects of legal or management constraints on mining activities, are defined as follows:

Available - Lands where resource development is routinely initiated by private industry; management practices do not discourage or preclude mineral exploration or development.

Slightly to moderately restricted - Lands where legal constraints or management practices discourage private industry from initiating mineral exploration or development.

Unavailable or severely restricted - Lands closed to operation of some or all of the mineral laws, or where legal constraints or management practices greatly discourage or prohibit mineral exploration or development. See Hyndman (1991).

An aggregate of about 390,000 acres of Challis National Forest lands is considered to have mining development potential. Of this acreage, 31 percent remains available to potential mining development, 13 percent has slight-to-moderate management restrictions, and 56 percent is severely restricted or unavailable to potential mining development because of management practices or legislation. See figure 16.

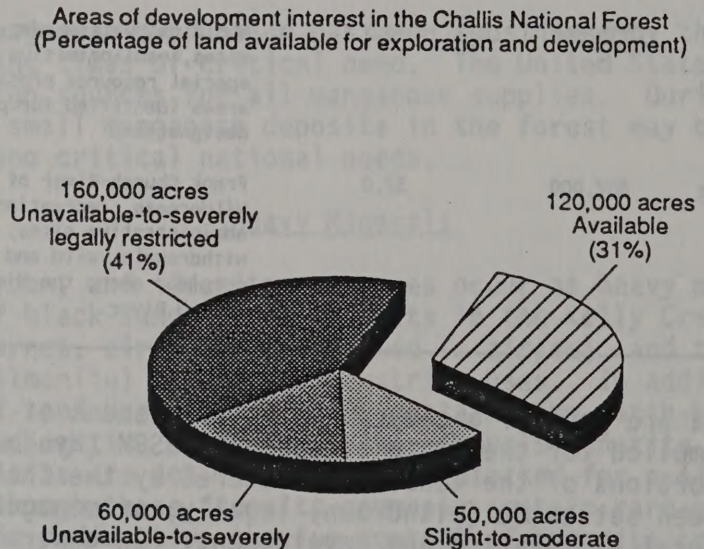

FIGURE 16.--Status of areas of mining development interest.

In figure 17, areas of development interest[2] are compared spatially with the availability of forest lands for exploration and development of mineral resources. Information in figure 17, reflects the status of forest lands as of October 1987. The land assessment shows that within the 2,516,191-acre boundaries of the Challis National Forest, 37.1 percent of the area, or about 935,000 acres, is managed according to multiple-use principles and is available to mineral entry under Federal mining and leasing laws. These lands include all open, unappropriated Federal lands and reconveyed lands for which an "open-to-entry" notification has been issued. Of the 935,000 acres of available land, approximately 120,000 acres is considered to have mineral development potential.

About 545,000 acres, or 21.6 percent of the forest, is considered to have management restrictions to mineral entry of limited severity (see Hyndman, 1989) that must be addressed in any plan of proposed operations. These lands include identified visual resource or semi-primitive unroaded areas, scenic travel routes, and big game or other key habitats. Of this 545,000 acres, about 50,000 acres is considered to have mining development potential.

About 2,000 acres, or 0.1 percent of the forest, has legal restrictions to mineral entry of moderate severity, mainly under power site classifications.

About 232,000 acres, or 9.2 percent of the forest, is unavailable because of management decisions and is severely restricted to mineral development. These include such lands as municipal watersheds; administrative sites; semi-primitive, unroaded areas; special resource protection areas; and areas identified for potential wilderness designation. Of the 232,000 acres of forest land severely restricted by management decision, about 60,000 acres is considered to have mining development potential.

About 807,000 acres, or 32.0 percent of the forest, is legally unavailable to mineral development. These lands are mainly within the Frank Church-River of No Return Wilderness but include other categories such as recreation and administrative sites, power project withdrawals, and the wild and scenic river corridor along the Middle Fork of the Salmon River. Of this 807,000 acres of unavailable forest lands, about 160,000 acres is considered to have mining development potential.

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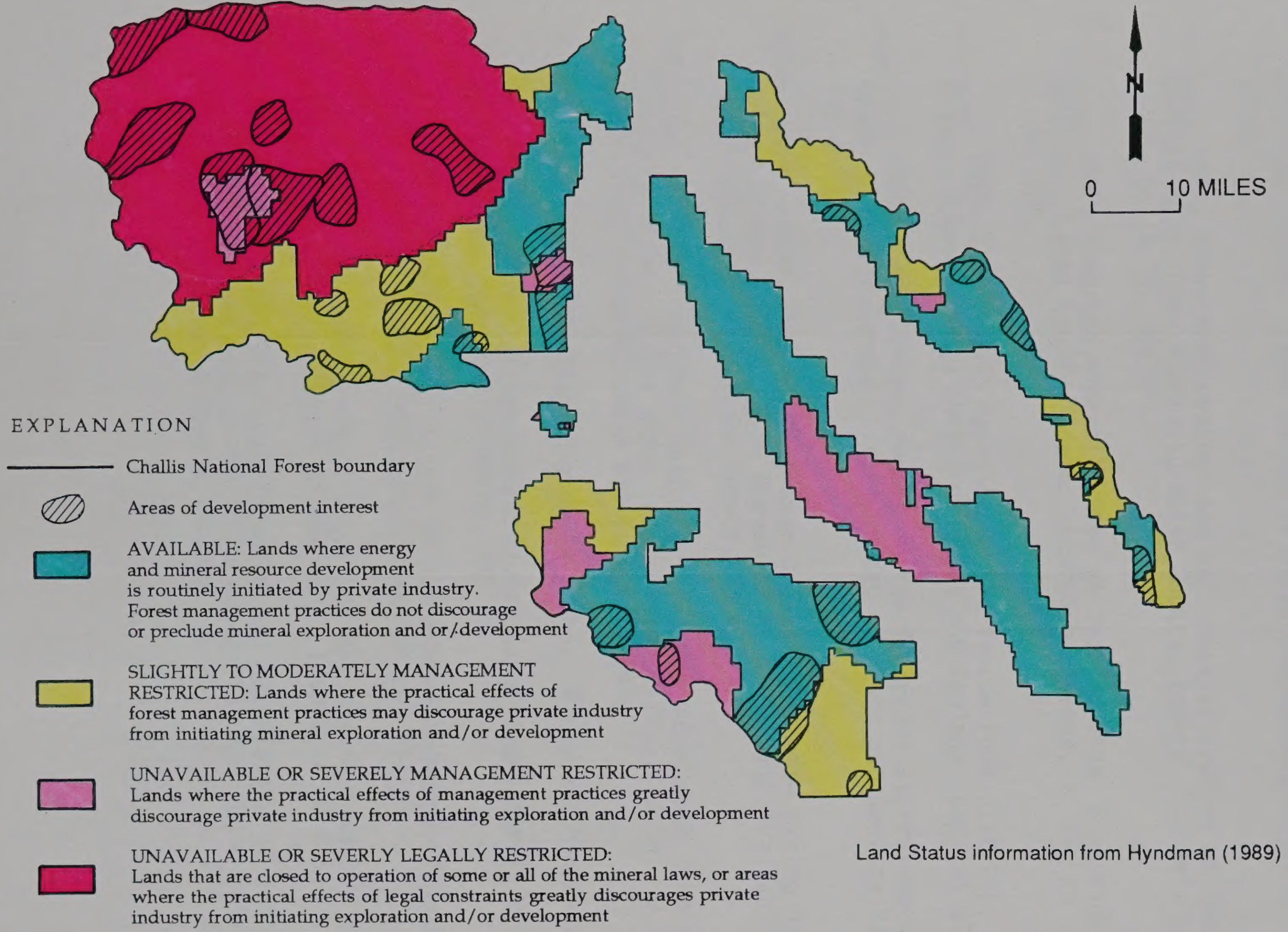
[2] Areas having favorable mineral characteristics such that mining companies may be expected to develop mineral deposits within the designated areas. Favorable characteristics include identified mineral resources, producing mines, deposits with past production, presence of strategic and critical minerals, favorable economic conditions, and other mining related factors. See Mineral Deposits and Identified Resources section of this report for further discussion of areas of development interest.



EXPLANATION

— Challis National Forest boundary

▨ Areas of development interest

🟦 AVAILABLE: Lands where energy and mineral resource development is routinely initiated by private industry. Forest management practices do not discourage or preclude mineral exploration and or/development

🟨 SLIGHTLY TO MODERATELY MANAGEMENT RESTRICTED: Lands where the practical effects of forest management practices may discourage private industry from initiating mineral exploration and/or development

🟪 UNAVAILABLE OR SEVERELY MANAGEMENT RESTRICTED: Lands where the practical effects of management practices greatly discourage private industry from initiating exploration and/or development

🟥 UNAVAILABLE OR SEVERLY LEGALLY RESTRICTED: Lands that are closed to operation of some or all of the mineral laws, or areas where the practical effects of legal constraints greatly discourages private industry from initiating exploration and/or development

Land Status information from Hyndman (1989)

FIGURE 17.-Availability of Challis National Forest lands for mineral exploration and development (land status as of October 1987)

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APPENDIX A.--Summary descriptions of mines and prospects in the Challis National Forest

Table A-1.--Mines and prospects in the Middle Fork Ranger District

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
1	Mule Train prospect (T18N, R10E, sec. 29)	The workings are in iron-oxide-stained, quartz-rich granodiorite.	One trench and three pits.	One sample from the western pit had 0.02 oz/ton gold, 0.05 oz/ton silver, and traces of copper, lead, and zinc. A composite sample from three other dumps contained 0.02 oz/ton gold and traces of copper, lead, and tungsten (Cater and others, 1973, p. 357).
2	Vesper prospect (T18N, R10E, sec. 29)	Quartz veinlets (stockworks) are in iron-oxide-stained granodiorite. Granodiorite float with disseminated molybdenum is present.	Two trenches and three pits.	Two samples from the dumps contained 0.14 oz/ton silver and a trace copper and gold (Cater and others, 1973, p. 358).
3	Jerico prospect (T18N, R10E, sec. 29)	Numerous small quartz veinlets (stockworks) intersect in granodiorite. Granodiorite float with disseminated molybdenum is present.	One trench and one pit.	Two grab samples from the dumps contained traces of gold and copper (Cater and others, 1973, p. 358).
4	Lucky Boy placer (T18N, R10E, sec. 28)	Alluvium on bank of Little Indian Creek consists of clayey, iron-oxide-stained soil with disseminated flakes of mica, grains of quartz, and fragments of rhyolite porphyry.	Three small trenches.	Panned concentrates from trenches contained a trace gold and silver (Cater and others, 1973, p. 358).
5	Murphy Peak prospect (T18N, R10E, sec. 21)	A talus slope is covered with cobble-sized fragments of rhyolite porphyry.	One pit.	One grab sample from the dump contained traces of gold and silver (Cater and others, 1973, p. 358).
6	Giant Legge group (T18N, R10E, sec. 26)	Heavily iron-oxide-stained zone in red rhyolite is exposed for about 3,600 ft and is 200 ft thick.	Two pits.	One chip sample across altered zone: 0.02 oz/ton gold and 0.25 oz/ton silver (Cater and others, 1973, p. 369).
7	Gem group (T18N, R10E, sec. 24)	Red rhyolite porphyry about 400 ft thick overlies gray rhyolite porphyry about 100 ft thick. Rhyolite flows trend northeast and dip 5°-15°NW.	None.	Samples contained no gold or silver (Cater and others, 1973, p. 369).
8	Brooklin prospect (T18N, R11E, sec. 19)	Contact between red rhyolite and gray andesite.	One small pit.	Three samples contained no gold or other valuable minerals (Cater and others, 1973, p. 369).
9	Hercules group (T18N, R11E, sec. 22)	Contact between red, altered rhyolite and yellow-to-gray rhyolite strikes N26°W and dips vertically. No sulfides are visible in the 3,600 ft contact zone.	None.	Samples averaged 0.02 oz/ton gold and 0.25 oz/ton silver (Cater and others, 1973, p. 369).
10	Dynamitabe placer (T18N, R11E, sec. 27)	A gravel deposita on Dynamite Creek covers 11.5 acres. The alluvium is derived mainly from glacial debris containing volcanic rocks.	None.	An estimated 185,000 yd^3 of gravel: gold values range from a trace to 0.1 cents/yd^3 (gold at $47.85/oz). Black sands are estimated at 1.0 lb/yd^3 (Cater and others, 1973, p. 371).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
11	Hope prospect (T18N, R11E, sec. 28)	Bedrock is iron-oxide-stained rhyolite porphyry.	One small pit.	One grab sample contained traces of gold and silver, and 0.04% copper (Cater and others, 1973, p. 370).
12	Jerome group (T18N, R11E, sec. 27)	Soil zone from red rhyolite porphyry.	Two small pits.	Two samples contained traces of gold and silver (Cater and others, 1973, p. 370).
13	McKnight group (T18N, R11E, sec. 27)	Iron-oxide-stained rhyolite porphyry float covers an area 1,300 ft long by 500 ft wide.	Five pits.	Five samples from dumps contained no gold or silver (Cater and others, 1973, p. 370).
14	Gold Cord group (T18N, R11E, sec. 34)	Altered red rhyolite crops out over an area 1,200 ft long and 600 ft wide with an exposed thickness of 200 ft.	One caved adit estimated 25- to-50 ft long and one small pit.	Two samples contained traces of gold and silver (Cater and others, 1973, p. 370).
15	Chief Executive group (T17N, R11E, sec. 3)	Talus of weathered rhyolite tuff is host material.	One sloughed trench.	One sample from the dump contained 0.01 oz/ton gold and traces of silver and copper (Cater and others, 1973, p. 358).
16	Allegheny group (T18N, R11E, sec. 35)	Red-to-brown rhyolite porphyry.	One caved adit estimated 150 ft long and two pits.	Samples contained no gold or silver or unusual amounts of other metals (Cater and others, 1973, p. 370).
17	Grays Peak Opal deposit (T17N, R11E, sec. 1)	Opal occurs in small veins, pods, and stringers in a light gray, highly altered, and silicified rhyolite porphyry flow about 1-mi long and 50- to 100-ft thick. Opal and associated limonite constitutes about 1% of the rock and lies just below a marker bed of rhyolite containing black obsidian.	None.	Opal is of poor gem quality (Cater and others, 1973, p. 371).
18	Daylight and Darkness placer (T18N, R11E, sec. 24)	Gravel deposit on Dynamite Creek covers 16.5 acres.	None.	An estimated 400,000 yd^3 of gravel: gold values range from a trace to 0.1 cents/yd^3 (gold = $47.85/oz). Black sand is estimated at 1.1 lb/yd^3 (Cater and others, 1973, p. 372).
19	Bonanza placer (T18N, R11E, sec. 25)	Gravel deposit on upper Marble Creek covers 11.1 acres.	None.	An estimated 890,000 yd^3 of gravel: gold values ranged from a trace to 0.3 cents/yd^3 (gold at $47.85/oz). Black sand is estimated at 1.9 lb/yd^3 (Cater and others, 1973, p. 372).
20	Mountain View placer (T18N, R12E, sec. 25)	Gravel deposit on upper Marble Creek covers 5.0 acres.	None.	An estimated 440,000 yd^3 of gravel: gold values ranged from a trace to 0.3 cents/yd^3 (gold at $47.85/oz). Black sand is estimated at 1.1 lb/yd^3 (Cater and others, 1973, p. 372).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
21	Golden Rule placer (T18N, R12E, sec. 31)	Gravel deposit on upper Marble Creek covers 2.3 acres.	None.	An estimated 180,000 yd^3 of gravel: gold values range from a trace to 0.3 cents/yd^3 (gold at $47.85/oz). Black sand is estimated at 2.7 lb/yd^3 (Cater and others, 1973, p. 372).
22	Camas Creek placer (T18N, R15E, sec. 16)	Gravel at mouth of Camas Creek covers about 14 acres. About 30 ft of stream gravel on the upper bench has a thin soil cover of about 6 in.	One old pit near the mouth of Camas Creek on the east side.	An estimated 450,000 yd^3 of gravel; gold values taken from five sample sites ranged from a trace to 1.4 cents/yd^3 (gold at $47.85/oz); black sand ranged from 0.4 to 3.8 lb/yd^3 (Cater and others, 1973, p. 287, 290). Black sand minerals include about 60% magnetite and 40% pyroxene and amphibole.
23	Camas Creek Point placer (T18N, R15E, sec. 16)	Gravel on the Middle Fork of the Salmon River covers 11 acres.	Unknown.	An estimated 1,225,000 yd^3 of gravel: samples contained traces of gold and an estimated 0.8 lb/yd^3 of black sands (Cater and others, 1973, p. 287).
24	Yellowjacket placer (T18N, R16E, sec. 20)	Sandy alluvium derived from glacial detritus composed mainly of Challis Volcanics is in terraces along Camas Creek.	Unknown.	Volume of the terraces ranges from 2,200 to 9,250 yd^3. Five channel samples each consisting of one gold pan full of alluvium contained up to 68 cents/yd^3 gold and averaged 1.3 cents/yd^3 (gold at $47.85/oz). Black sand concentrates ranged from 4.6 to 10.2 lb/yd^3 (Cater and others, 1973, p. 382).
25	Geothermal location (T18N, R15E, sec. 29)	Low temperature geothermal system, near the Tappan Ranch on the Middle Fork of the Salmon River, is probably controlled by faults in underlying Tertiary granite (Ross, 1971, p. 50).	Unknown.	None.
26	Tappan Ranch placer (T18N, R14E, sec. 25)	Gravel on Middle Fork of the Salmon River at the mouth of Grouse Creek covers 33 acres.	Unknown.	An estimated 2,076,000 yd^3 of gravel is present. Gold values taken from three sample sites ranged from a trace to 1.4 cents/yd^3 (gold at $47.85/oz) and 0.8 to 5.1 lb/yd^3 of black sand (Cater and others, 1973, p. 287, 290).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
27	Sullivan Uranium prospect (T17N, R14E, sec. 1) Bill Sullivan and Associates	Pink Tertiary granite has an iron-oxide-stained shear zone striking N43°E, dipping 70°NW, about 15-ft wide, 8-ft long and 5-ft deep and may extend another 600 ft. Another shear zone trends N50°E and dips 60°-80°SE in Tertiary granite near the contact with overlying marble. The shear zone contains uranium, fluorite, quartz, pyrite, arsenopyrite, chalcopyrite, and thorite. Remnants of dolomitic marble occur at the prospect.	One 5-ft adit and two pits.	Low-grade uranium-thorium material exposed in a shear zone contains 23,000 tons of inferred uranium resources averaging 0.004% U_3O_8, 0.1 oz/ton silver, 0.1% lead, and 0.2% zinc. Another 800 tons of granite averages 0.024% U_3O_8. A total of about 2,000 lb of U_3O_8 is estimated. Five chip and one grab sample were taken (Cater and others, 1973, p. 276) (Fisher and Johnson, 1987, p. 144)
28	Hospital Bar placer (T17N, R14E, sec. 2)	Gravel on the Middle Fork of the Salmon River covers 13 acres.	Unknown.	An estimated 503,000 yd^3 of gravel are present. Samples from three sites had gold values ranging from a trace to 3.4 cents/yd^3 (gold at $47.85/oz). Black sands ranged from 0.7 to 2.2 lb/yd^3 (Cater and others, 1973, p. 287, 290).
29	Hospital Hot Spring (T17N, R14E, sec. 2)	A low temperature geothermal system is probably controlled by a fault in Tertiary granite (Ross, 1971, p. 49).	Unknown.	A chemical analysis from the hot spring gave the following result in milligrams per liter: SiO_2, 55; Ca, 3.4; Mg, 0.0; Na, 84; K, 1.3; HCO_3, 149; CO_3, 0; SO_4, 43; Mn, 0; Cl, 14; Na/K, 67; Cl/SO_4, 0.3; pH, 8.3; F, 13; and Cl/F, 1.1 (Cater and others, 1973, p. 388)
30	Woodtick group (T17N, R15E, sec. 15)	A roof pendant of Precambrian schist is underlain by Eocene granite. Quartz veinlets occur in granite and schist along the contact. Limestone and quartz lenses from 0.5-5 ft thick and up to 200 ft long; veins from 0.1 to 0.3 ft wide and 1 to 10 ft long are in the schist. Challis volcanics crop out southeast of the pendant and contain many fractures, veins, and dikes.	Three pits.	Samples from a quartz lens contained traces of gold and 0.3 oz/ton silver. Samples from a limestone lens had traces of gold and 0.2 oz/ton silver. A sample from a baked contact zone contained 0.01 oz/ton gold and 0.2 oz/ton silver. Samples from structures in the Challis Volcanics averaged a trace gold and 0.3 oz/ton silver (Cater and others, 1973, p. 380-382).
31	Copper Mountain (Mary Kate) prospect (T17N, R9E, sec. 2)	Iron-oxide stained granodiorite is along a limestone contact.	One caved adit and two pits.	Ten samples contained up to 0.26 oz/ton silver and traces of copper, gold, and tungsten. One sample from the adit dump contained 0.14% WO_3 and 0.36% copper (Cater and others, 1973, p. 355).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
32	Big Chief claims (T17N, R9E, sec. 2)	Scheelite is in a narrow body of tactite along a limestone-granodiorite contact. The pod is about 1-ft wide and is exposed for 50 ft.	Four pits.	About 1,000 tons of tactite resources averaging 0.43% WO_3. Five chip samples from the tactite zone contained from 0.29% to 0.73% WO_3. Four grab samples from dumps contained from a trace to 0.10 oz/ton silver and a trace gold, copper, and lead (Cater and others, 1973, p. 357).
33	Rock Rabbit prospect (T17N, R9E, sec. 10)	Quartz veinlets from 0.1 to 0.5 in. wide are in granodiorite. Hematite and limonite occur as vug fillings, fracture coatings, and stains.	One trench and eight pits.	Two grab samples contained 0.05 oz/ton silver (Cater and others, 1973, p. 357).
34	Duches N. prospect (T17N, R9E, sec. 11)	Iron-oxide-stained, granitic talus.	One pit.	One grab sample contained traces of gold and silver (Cater and others, 1973, p. 357).
35	S.J. prospect (T17N, R9E, sec. 10)	Iron-oxide stained granitic talus.	One sloughed trench.	One grab sample contained trace gold and copper (Cater and others, 1973, p. 357).
36	Slide prospect (T17N, R9E, sec. 11)	Iron-oxide-stained, aplitic-textured granodiorite.	One 10-ft-long trench.	Grab samples contained traces of copper (Cater and others, 1973, p. 357).
37	Several Pits prospect (T17N, R9E, sec. 16)	Pits are in iron-oxide-stained granitic talus.	Several small sloughed pits.	One grab sample of granitic material contained 0.01 oz/ton gold and trace copper, lead, and molybdenum (Cater and others, 1973, p. 357).
38	Snow Storm prospect (T17N, R9E, sec. 16)	Vuggy, iron-oxide stained quartz vein float with traces of bornite is in granitic talus.	One sloughed pit.	Analysis of dump material averaged 0.05 oz/ton silver, 0.16% lead and trace copper, gold, and molybdenum (Cater and others, 1973, p. 357).
39	Minnie Wilson No. 1 prospect (T17N, R9E, sec. 16)	Quartz vein float is in granodiorite talus. The minerals bornite, malachite, and marcasite are in vein material.	One sloughed pit.	One sample from a stockpile contained 0.05 oz/ton silver and traces of copper (Cater and others, 1973, p. 356).
40	Old Faithful group (T17N, R9E, sec. 28)	Boulders of massive pyrrhotite derived by glacial plucking from the site of the Springfield Scheelite deposit.	Two pits.	An estimated 500 tons of tungsten resources averaging 0.30% WO_3 is present in boulders (Cater and others, 1973, p. 213).
41	Springfield Scheelite mine (T17N, R90E, sec. 28) Lafe & and Emma Cox	A roof pendant consisting of a tactite body, about 400-ft long, 225-ft wide, and 50-ft thick, rests on quartz monzonite of the Idaho batholith.	One open pit, two caved adits. About 39,000 tons of ore averaging 0.35% WO_3 (5,940 short ton units) were produced from talus and mined ore (Cater and others, 1973, p. 210).	An estimated 178,000 tons of resources averaging 0.27% WO3 remain at the mine. Forty-eight samples were taken (Cater and others, 1973, p. 210-213).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
42	Kwiskwis (Quis-Quis) Hot Spring (T17N, R10E, sec. 11)	A hot spring on Indian Creek discharges 15.0 (1972) gallons of water per minute through the Challis Volcanics. This low temperature geothermal system is probably controlled by faults in the underlying granite	Unknown.	A chemical analysis from the hot spring gave the following result in milligrams per liter: SiO_2, 77; Ca, 2.3; Mg, 0.0; Na, 110; K, 2.0; HCO_3, 87; CO_3, 22; SO_4, 73.0; Mn, 0.0; Cl, 19.0; Na/K, 55; Cl/SO_4, 0.3; pH, 8.7; F, 17.0; and Cl/F, 1.1 (Cater and others, 1973, p. 388).
43	Middle Fork Indian Cr Hot Springs (T17N, R11E, sec. 21)	Two hot springs on the Middle Fork of the Salmon River discharge 1.5 and 40.0 gallons of water per minute with a temperature of 162 °F and 191 °F, respectively. Water discharges through Challis volcanics and a dike in the Idaho batholith (Cater and others, 1973, p. 387).	Unknown.	Chemical analyses from each of the hot springs gave the following results in milligrams per liter: SiO_2, 110 and 110; Ca, 2.1 and 2.0; Na, 120 and 110; K, 3.7 and 3.6; HCO_3, 116 and 131; CO_3, 25 and 14; SO_4, 64 and 62; Mn, 10 and 0; Cl, 14 and 14; pH, 8.7 and 8.6; F, 17 and 18 (Cater and others, 1973, p. 388).
44	Wild Dream prospect (T16N, R11E, sec. 5)	Irregular yellow-to-red jasperoid body, about 60 ft wide, 100 ft deep, and 600 ft long, is on the contact between quartz monzonite and the Challis Volcanics.	Seven pits.	Samples of jasperoid material contained no concentrations of metallic minerals, but may be of interest to mineral collectors (Cater and others, 1973, p. 225).
45	Gold Flat prospect (T17N, R11E, sec. 34)	The prospect is in iron-oxide-stained granitic rock containing narrow quartz stringers.	Several small sloughed pits.	Two grab samples from the pits contained a trace gold, silver, and copper (Cater and others, 1973, p. 356).
46	Indian Creek Landing Field placer (T17N, R11E, sec. 34)	Alluvium is in a terrace deposit 30 ft above the level of the Middle Fork of the Salmon River; the densely forested terrace covers 165 acres.	Four pits and one trench.	The deposit contains an estimated 8 million yd^3 of gravel. Channel samples contained gold values ranging from trace to 4.1 cents/yd^3 (gold at $47.85/oz) and black sand concentrates ranging from less than 1 lb/yd^3 to 2 lb/yd^3. The average magnetite content was about 30% of the black sand (Cater and others, 1973, p. 359).
47	Come Back prospect (T17N, R11E, sec. 34)	A silicified shear zone up to 5-ft wide is in rhyolite. The shear zone strikes N87°E and dips 49°NW and has iron-oxide-stained, white quartz lenses 0.5-2 ft wide along shear planes. Galena, sphalerite, chalcopyrite, and bornite occur as thin fillings and coatings in shear zones and are sparsely disseminated through the quartz.	One caved adit and one pit.	Two chip samples across the shear zone contained 0.05 oz/ton gold, 0.67 oz/ton silver, 0.12% copper, and 0.04% lead (Cater and others, 1973, p. 356).
48	Indian Creek quartz deposit (T17N, R11E, sec. 34)	Massive quartz body averaging 100-ft long, 100-ft wide, and 50-ft high is in biotite gneiss and quartzite. The quartz grades into quartzite on the north side.	None	One sample suggests this occurrence is low-quality silica (Cater and others, 1973, p. 356).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
49	Huntington placer (T16N, R11E, sec. 4)	Gravel covers 120 acres along the Middle Fork of the Salmon River.	Unknown.	An estimated 7,550,000 yd^3 of gravel is present. Samples from three sites had gold values ranging from 1.4 to 6.8 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.4 to 1.0 lb/yd^3 (Cater and others, 1973, p. 287, 295).
50	Pungo Creek fluorspar prospect (T17N, R11E, sec. 36)	Fluorite occurs as a veins, in small veinlets, and as disseminations in a siliceous brecciated 5-ft-wide fault zone which cuts porphyritic diorite. The fault zone strikes N40°-45°E and dips steeply. Vein width averages 1.5 ft, ranging from 0.6 to 3 ft and has a total length of 700 ft. Fluorite is massive, white, green, and blue, with minor quartz.	Two short adits, three open cuts, and a trench.	Fluorspar resources estimated to be 26,000 tons; about 13,000 tons of acid-grade material is estimated (Cater and others, 1973, p. 353).
51	Spring Creek prospect (T17N, R12E, sec. 34)	A quartz fissure vein strikes N20°W and dips 74°SW in pink granite. The 100 ft long vein has limonite pseudomorphs after pyrite; float contains pyrite.	None.	Samples contained up to 0.02 oz/ton gold, 0.28 oz/ton silver, and 0.1% lead (Cater and others, 1973, p. 371).
52	Mitchell Ranch placer (T17N, R12E, sec. 34)	Alluvial deposits on Marble Creek cover 40 acres.	Unknown.	An estimated 640,000 yd^3 of gravel. Samples contained traces of gold and an estimated 0.38 lb/yd^3 of black sand (Cater and others, 1973, p. 372).
53	Marble Creek Fluorspar occurrence (T17N, R12E, sec. 25)	Fissure veins of quartz, calcite, and fluorspar occur in granitic rock. A 1.2-ft-wide quartz vein, striking N54°E and dipping 50°SE, has zones of fluorspar pods. The vein is exposed for 20 ft.	None.	A chip sample taken at 5 ft intervals contained 20.5% CaF_2 (Cater and others, 1973, p. 371).
54	Pine Creek placer (T17N, R13E, sec. 32)	A gravel bar above the mouth of Pine Creek on the Middle Fork of the Salmon River covers 25 acres.	Unknown.	An estimated 1,580,000 yd^3 of gravel are present. A sample from one site had gold values ranging from a trace to 27.3 cents/yd^3 (gold at $47.85). Black sand ranged from 0.9 to 2.2 lb/yd^3 (Cater and others, 1973, p. 287, 293) .
55	Crystal uranium prospect (T17N, R13E, sec. 32)	An outcrop of pink Tertiary granite is at the confluence of Pine Creek and the Middle Fork of the Salmon River.	None.	Scintillometer readings were two to three times higher than background at the prospect (Cater and others, 1973, p. 278).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
56	Upper-Lower Red Bluff Creek placers (T17N, R13E, sec. 33)	Two gravel bars, below the mouth of Red Bluff Creek on the Middle Fork of Salmon River, cover 6 and 25 acres.	Two cabins and a number of ditches and placer pits. A little placer mining was done in the summer of 1926 on the south side of Red Bluff Creek (Ross, 1934, p. 103).	An estimated 380,000 yd^3 (lower bar) and 1,580,000 yd^3 (upper bar) of gravel is present. Samples from six sites had gold values ranging from a trace to 5.5 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.4 to 7.7 lb/yd^3 (Cater and others, 1973, p. 287, 292-293).
57	Lower Bacon Creek placer (T17N, R13E, sec. 33)	A gravel bar on the Middle Fork of the Salmon River covers 9 acres.	Unknown.	An estimated 292,000 yd^3 of gravel are present. Samples from two sites had gold values ranging from a trace to 2.1 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.8 to 3.2 lb/yd^3 (Cater and others, 1973, p. 287, 292).
58	Bacon Creek placer (T17N, R13E, sec. 33)	A gravel bar at the mouth of Bacon Creek covers 21 acres.	Unknown.	An estimated 1,016,000 yd^3 of gravel are present. Sample from three sites had gold values ranging from a trace to 13.0 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.4 to 4.6 lb/yd^3 (Cater and others, 1973, p. 287, 292).
59	Culver Creek placer (T17N, R13E, sec. 27)	A gravel bar on the Middle Fork of the Salmon River covers 15 acres.	Unknown.	An estimated 1,210,000 yd^3 of gravel are present. Samples from three sites had gold values ranging from a trace to 34.2 cents/yd^3 (gold at $47.85). Black sand ranged from 0.9 to 5.0 lb/yd^3 (Cater and others, 1973, p. 287, 292).
60	Rock Island placer (T17N, R13E, sec. 27)	A gravel bar on the Middle Fork of the Salmon River covers 13 acres.	Unknown.	An estimated 818,000 yd^3 of gravel are present. Samples from two sites had gold values ranging from a trace to 1.4 cents/oz (gold at $47.85). Black sand ranged from 0.1 to 1.8 lb/yd^3 (Cater and others, 1973, p. 287, 292).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
61	Cox Hot Spring (T17N, R13E, sec. 27)	Three hot springs discharge about 10 gallons of water per minute near the Middle Fork of Salmon River. This low temperature geothermal system is probably controlled by faults in the underlying Tertiary granite (Ross, 1971, p. 48, no. 49).	Unknown.	Three chemical analyses from hot spring water gave the following results in milligrams per liter: SiO_2, 69, 81, and 67; Ca, 1.9, 1.8, and 2.4; Mg, 0.0, 0.0, and 0.0; Na, 84, 100, and 93; K, 1.0, 1.4, and 1.1; HCO_3, 83, 150, and 138; CO_3, 20, 7, 0.0; SO_4, 42, 49, and 47; Mn, 0.0, 0.0, and 0.0; Cl, 9.9, 12.0, and 11.0; Na/K, 84, 71, and 85; Cl/SO_4, 0.2, 0.2, and 0.2; pH, 8.8, 8.4, and 7.5; F, 15, 15, 16; and Cl/F, 0.7, 0.8, and 0.7 (Cater and others, 1973, p. 388).
62	Cox Hot Spring Bar placer (T17N, R13E, sec. 27)	A gravel bar on the Middle Fork of the Salmon River covers 8 acres.	Unknown.	An estimated 194,000 yd^3 of gravel are present. Samples from four sites had gold values ranging from a trace to 2.7 cents/oz (gold at $47.85/oz). Black sand ranged from 0.4 to 5.8 lb/yd^3 (Cater and others, 1973, p. 287, 292).
63	Shep Creek Bar placer (T17N, R13E, sec. 26)	A gravel bar on the Middle Fork of the Salmon River covers 7 acres.	Unknown.	An estimated 227,000 yd^3 of gravel are present. Samples from one site had gold values ranging from a trace to 2.1 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.3 to 0.8 lb/yd^3 (Cater and others, 1973, p. 287, 291).
64	White Creek Bar placer (T17N, R13E, sec. 23)	A gravel bar at the mouth of White Creek on the Middle Fork of the Salmon River covers 13 acres.	Unknown.	An estimated 629,000 yd^3 of gravel are present. Samples from four sites had gold values ranging from a trace to 3.4 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.3 to 2.8 lb/yd^3 (Cater and others, 1973, p. 287, 291).
65	Geothermal location (T17N, R14E, sec. 22)	A hot spring discharges about 10 gallons of water per minute on Loon Creek near the mouth of Cache Creek. This low-temperature geothermal system is probably controlled by faults in the Challis Volcanics and underlying granite (Ross, 1971, p. 50, no. 55).	Unknown.	None.
66	Simplot Ranch placer (T17N, R14E, sec. 15)	A gravel bar on the Middle Fork of the Salmon River at the mouth of Loon Creek covers 75 acres. Seven acres of the bar are privately owned.	Unknown.	An estimated 4.4 million yd^3 of gravel are present. Samples from seven sites had gold values ranging from a trace to 19.1 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.2 to 5.6 lb/yd^3 (Cater and others, 1973, p. 287, 291).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
67	Prospect (T17N, R15E, sec. 29)	There was some prospecting in the area around Sleeping Deer Mountain. Vein matter containing galena, chalcopyrite, pyrite, and other metallic minerals were found. The principal discoveries are near the head of Liberty Pole Creek, on both sides of Woodtick Creek near its head, and on the upper reaches of Grouse Creek. A prospect above Cabin Creek was located by R. L. Falconberry, because the black schist there looked like a rock favorable to mineralization (Ross, 1934, p. 98 125).	Several shallow cuts.	The prospect above Cabin Creek was abandoned without finding any sulfide minerals. The gash veins on the western side of Woodtick Creek are almost untouched and do not look sufficiently promising to warrant much development (Ross, 1934, p. 98, 125).
68	Virginia Beth prospect (T16N, R10E, sec. 4)	Molybdenite occurs as Cretaceous stockworks in a shear zone in granite of the Idaho batholith for a strike length of 700 ft and width of 50 to 200 ft, but the distribution is erratic and the grade is low. The shear zone strikes N75°E and dips 75°NW. The quartz filled, iron-stained shear zone also contains pyrite, hematite, limonite, and chalcopyrite (Fisher and Johnson, 1987, p. 155).	Four pits.	Samples contained traces of gold, none to 0.10 oz/ton silver, trace to 0.07 copper, and 0.02% to 0.52% molybdenum (Cater and others, 1973, p. 224).
69	Primitive group placer (T16N, R10E, sec. 20)	Poorly sorted quartz monzonite alluvium is in gravel terraces and stream bars covering 5.1 acres.	Unknown.	An estimated 75,000 yd^3 of gravel. Two samples from two sites contained traces of gold and 1.6 lb/yd^3 black sand each (Cater and others, 1973, p. 226).
70	Iowa-Virginia placer (T16N, R10E, sec. 15)	Poorly sorted quartz monzonite alluvium is in gravel terraces and stream bars covering 4.5 acres.	Unknown.	An estimated 50,000 yd^3 of gravel. One sample of 0.5 ft3 of gravel contained traces of gold. The samples contained an estimated 1.6 lb/yd^3 of black sands (Cater and others, 1973, p. 226).
71	Green Rock prospect (T16N, R10E, sec. 15)	A 24-ft-wide andesite dike and a 5-ft-wide rhyolite dike are in quartz monzonite. The dikes have iron-oxide-stained fractures containing about 1% pyrite.	One caved adit and one pit.	Samples contained no gold, silver, or copper (Cater and others, 1973, p. 225).
72	Indiana placer (T16N, R10E, sec. 21)	Poorly sorted quartz monzonite and quartzite alluvium is in gravel terraces and stream bars covering 18.5 acres.	Unknown.	An estimated 30,000 yd^3 of gravel. Two samples from two sites contained traces of gold and a trace and 2.5 lb/yd^3 black sand (Cater and others, 1973, p. 226).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
73	RDG prospect (T16N, R10E, sec. 27)	Andesite dikes strike N25°-40°E and dip 50°-80°SE in quartz monzonite. Dikes and wall rocks have disseminations of pyrite, molybdenite, and chalcopyrite.	Several small pits.	Samples contained traces of gold, silver, molybdenum, and copper (Cater and others, 1973, p. 225-226).
74	Molly mine group (T16N, R10E, sec. 14)	A metaquartzite roof pendant is underlain by quartz monzonite of the Idaho batholith. Intrusive rocks are altered, iron-oxide-stained, and cut by andesite and pegmatite dikes.	Two pits.	Samples of pegmatitic vein and adjacent altered quartz monzonite contained 0.10 oz/ton gold and 3.7 oz/ton silver. Other samples contained trace gold and silver (Cater and others, 1973, p. 225).
75	Cross Forks placer (T16N, R10E, sec. 14)	Poorly sorted quartz monzonite and quartzite alluvium is in gravel terraces and stream bars covering 4.1 acres.	Unknown.	An estimated 40,000 of yd^3 of gravel. Two samples from one site contained a trace and 0.5 cents/yd^3 gold (gold at \$47.85/oz). Black sands averaged 0.6 lb/yd^3 (Cater and others, 1973, p. 226).
76	Geothermal location (T16N, R10E, sec. 14)	A geothermal spring on Little Pistol Creek discharges 10 gallons of water per minute. This low temperature geothermal system is probably controlled by faults and joints in the granite of the Idaho batholith (Ross, 1971, p. 49).	Unknown.	Two chemical analyses from hot spring water gave the following results in milligrams per liter: SiO_2, 71 and 67; Ca, 3.7 and 5.0; Mg, 0.2 and 0.2; Na, 89 and 83; K, 1.4 and 1.4; HCO_3, 108 and 98; CO_3, 0.0 and 0.0; SO_4, 66 and 67; Mn, 0.0 and 3.0; Cl, 13 and 12; Na/K, 64 and 59; Cl/SO_4, 0.2 and 0.2; pH, 6.3 and 6.3; F, 12 and 10; and Cl/F 1.2 (Cater and others, 1973, p. 388).
77	Speckled Trout placer (T16N, R10E, sec. 14)	Poorly sorted quartz monzonite alluvium is in gravel terraces and stream bars covering 1.7 acres.	Unknown.	An estimated 40,000 yd^3 of gravel are present. Three samples from two sites contained trace gold. Black sand is estimated at 1.2 lb/yd^3 (Cater and others, 1973, p. 226).
78	Twenty-five Creek placer (T16N, R10E, sec. 13)	Poorly sorted quartz monzonite alluvium is in gravel terraces and stream bars covering 1.4 acres.	Unknown.	An estimated 35,000 yd^3 of gravel; two samples from one site contained a trace gold and black sand (Cater and others, 1973, p. 226).
79	Thirty-two Creek placer (T16N, R10E, sec. 13)	A gravel bench, covering 1.7 acres near the mouth of Thirty-two Creek, is composed mainly of granodiorite and volcanic rocks.	Unknown.	An estimated 40,000 yd^3 of gravel are present. One sample contained traces of gold and black sand (Cater and others, 1973, p. 226).
80	Buckhorn placer (T16N, R11E, sec. 17)	A forested gravel bench, covering 24 acres at the mouth of Pistol River, is composed mainly of quartz monzonite and volcanic rock.	Unknown.	An estimated 3,485,000 yd^3 of gravel are present. Six samples from two sites had gold values ranging from 0.7 to 1.4 cents/yd^3 (gold at \$47.85/oz). Black sands are estimated at 1.15 lb/yd^3 (Cater and others, 1973, p. 228).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
81	Horse Pistol placer (T16N, R11E, sec. 17)	A gravel bench, covering 14 acres at the mouth of the Pistol River, is composed mainly of quartz monzonite and volcanic rock.	Unknown.	An estimated 2,033,000 yd^3 of gravel are present. Three samples from three sites had gold values ranging from 0.7 to 2.7 cents/yd^3 (gold at $47.85/oz). Black sands are estimated at 0.5 lb/yd^3 (Cater and others, 1973, p. 228).
82	Mule Creek placer (T16N, R11E, sec. 9)	Gravel covers 8 acres along the Middle Fork of the Salmon River.	Unknown.	An estimated 465,000 yd^3 of gravel is present. Samples from two sites had gold values ranging from a trace to 4.1 cents/yd^3 (gold at $47.85/oz), and black sand ranging from 0.6 to 3.1 lb/yd^3 (Cater and others, 1973, p. 287, 295).
83	Indian Joe placer (T16N, R11E, sec. 17)	Gravel along the Middle Fork of the Salmon River covers 17 acres.	Unknown.	An estimated 990,000 yd^3 of gravel is present. Samples from five sites had gold values ranging from a trace to 16.4 cents/yd^3 (gold at $47.85/oz), and black sand ranging from 0.2 to 3.5 lb/yd^3 (Cater and others, 1973, p. 287, 295).
84	Lake Creek placer (T16N, R11E, sec. 17)	Gravel covers 2 acres at the mouth of Lake Creek.	Approximately 1,200 yd^3 of material was worked during the 1930's, but amount of production is unknown.	An estimated 30,000 yd^3 of gravel remains. Samples from five sites contained gold values ranging from a trace to 4.1 cents/yd^3 (gold at $47.85/oz), and black sand ranging from 0.1 to 0.8 lb/yd^3 (Cater and others, 1973, p. 287).
85	Lower's placer (T16N, R11E, sec. 17)	A gravel bench covering 14 acres on the Middle Fork of the Salmon River is composed mainly of quartz monzonite and volcanic rock.	Unknown.	An estimated 901,000 yd^3 of gravel is present. Eight samples from three sites contained gold values ranging from 1.4 to 57.8 cents/yd^3 (gold at $47.85/oz). The north end of the deposit is estimated to contain 100,000 yd^3 of gravel containing 20 to 40 cents/yd^3 gold (Cater and others, 1973, p. 228, 230).
86	Cap Creek prospect (T16N, R11E, sec. 20)	An iron-oxide stained, vertical quartz vein, 5-10 ft wide and more than 100 ft long, strikes N5°W.	One pit.	Samples contained traces of copper and lead (Cater and others, 1973, p. 225).
87	Teapot prospect (T16N, R11E, sec. 15)	A heavily iron-oxide-stained alteration zone is along the contact of a southeast-trending mafic dike. It cuts quartz monzonite of the Idaho batholith and contains small amounts of specular hematite.	Unknown.	One sample from the alteration zone contained traces of gold and 0.07 oz/ton silver and traces of copper (Cater and others, 1973, p. 275).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
88	Middle Fork Lodge placer (T16N, R12E, sec. 17)	A gravel bar covers 37 acres at the mouth of Thomas Creek.	Unknown.	An estimated 3 million yd^3 of gravel is present. Samples from five sites had gold values ranging from a trace to 17.8 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.4 to 2.3 lb/yd^3 (Cater and others, 1973, p. 287, 294-295).
89	Thomas Creek placer (T16N, R12E, sec. 16)	Gravel deposits cover 122 acres on the Middle Fork of the Salmon River.	None.	An estimated 10,212,000 yd^3 of gravel: three sample sites had gold values ranging from a trace to 41.0 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.1 to 3.1 lb/yd^3 (Cater and others, 1973, p. 287, 294).
90	Little Creek placer (T16N, R12E, sec. 16)	Gravel at the mouth of Little Creek covers 73 acres.	Unknown.	An estimated 9,430,000 yd^3 of gravel is present. Samples from three sites had gold values ranging from a trace to 1.4 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.2 to 1.5 lb/yd^3 (Cater and others, 1973, p. 287, 293-294).
91	Sunflower Flat placer (T16N, R12E, sec. 15)	A gravel bar along the Middle Fork of the Salmon River covers 13 acres.	Unknown.	An estimated 314,000 yd^3 of gravel is present. Samples from one site contained traces of gold and 0.8 to 3.1 lb/yd^3 black sand (Cater and others, 1973, p. 287, 293).
92	Jackass Flat placer (T16N, R12E, sec. 15)	A gravel bar along the Middle Fork of the Salmon River covers 40 acres.	None.	An estimated 1,296,000 yd^3 of gravel is present. Samples from three sites had gold values ranging from a trace gold to 4.8 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.1 to 4.3 lb/yd^3 (Cater and others, 1973, p. 287, 293).
93	Lower Thomas Creek placer (T16N, R12E, sec. 21)	A gravel bar covers 16 acres on the Middle Fork of the Salmon River.	Unknown.	An estimated 774,000 yd^3 of gravel is present. Samples from three sites had gold values ranging from a trace to 2.7 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.3 to 2.4 lb/yd^3 (Cater and others, 1973, p. 287, 294).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
94	Robinhood prospect (T16N, R12E, sec. 20)	Quartz veins are in shear zones in the Idaho batholith. Veins range from 0.25 to 2 ft thick with galena and malachite. Limonite and hematite are in the shear zone. A 0.2 to 0.4 in. wide pegmatite dike in the Idaho batholith trends N24°E and dips 68°NW. An andesite dike trends N50°-70°W and dips NE in the Challis Volcanics. A quartz vein is at a contact between mica schist and the Idaho batholith.	Three trenches and three pits.	Seven samples were taken. A sample from a shear zone contained 0.28 oz/ton gold, 22.9 oz/ton silver, 0.48% copper, and 5.41% lead. A sample from the pegmatite dike had 0.06 oz/ton gold, 1.7 oz/ton silver, 0.6% copper, and 0.4% lead. A sample from the mica/schist contact had 0.60 oz/ton silver. A sample from the andesite dike contained 0.20 oz/ton silver and 0.05% lead (Cater and others, 1973, p. 273).
95	Lovell-Jones prospect (T16N, R12E, sec. 30)	A flat-lying, 2-ft-thick quartz vein trends S54°E along a contact of the Idaho batholith and the Challis Volcanics. The vein is exposed for 75 ft. No sulfide minerals were seen.	One caved adit and three small pits.	One sample of the quartz vein contained 0.16 oz/ton gold and 0.39 oz/ton silver (Cater and others, 1973, p. 274).
96	Iowa Boy prospect (T16N, R12E, sec. 30)	Quartz vein material is from the dumps of workings exploring quartz monzonite of the Idaho batholith. The vein contains chalcopyrite, pyrite, and malachite.	One large cut and several small pits.	Seven grab samples of quartz vein ranged from a trace to 0.17 oz/ton gold, 0.03 to 6.0 oz/ton silver, and averaged 0.66% copper (Cater and others, 1973, p. 274).
97	Hogback Quartz prospect (T16N, R12E, sec. 29)	An east-trending quartz fissure vein is in schistose quartzite of the Yellowjacket Formation. The vein contains up to 5% pyrite, malachite, and iron- and manganese-oxide minerals.	One small exploration pit.	One sample from the dump contained 0.05% copper (Cater and others, 1973, p. 274).
98	Little Johnny prospect (T16N, R12E, sec. 28)	A quartz vein trending N50°E and dipping 24°NW is in quartz monzonite of the Idaho batholith.	One caved adit and two pits.	One sample contained 3.39 oz/ton silver, 0.4% lead, and no gold (Cater and others, 1973, p. 274).
99	Chickadee Quartz prospect (T16N, R12E, sec. 28)	Several small quartz-filled shear zones occur in northwesterly trending a mafic dike trending northwest in metasedimentary rocks. The quartz contains up to 5% pyrite, galena, and iron oxides.	Two small exploration pits.	One sample contained 0.21 oz/ton gold (Cater and others, 1973, p.274).
100	Thomas Creek No. 2 prospect (T15N, R12E, sec. 6)	A vertical andesite dike strikes N25°E in limestone. The highly fractured dike is 15 ft wide and 115 ft long. No visible mineralization.	One shallow pit.	Samples contained trace gold and 0.3 oz/ton silver (Cater and others, 1973, p. 206).
101	Thomas Creek No. 3 prospect (T15N, R12E, sec. 4)	An andesite porphyry dike trends N60°W in granitic rock. The highly fractured dike is 200 ft wide and 1,000 ft long. No mineralization is visible.	One 50-ft trench.	Samples contained traces of gold 0.2 oz/ton silver (Cater and others, 1973, p. 206).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
102	Dirty Dutchman prospect (T15N, R13E, sec. 7) Bill Sullivan; Stan Tappan	Tertiary dacite porphyry is fractured at the intersection of three major joints which served as the locus for mineralization. Gossan covers an area 25 ft by 30 ft at the junction of the joints. The gossan has many thin veins of chalcopyrite, argentiferous galena, and pyrite.	One trench.	A select sample contained 5.0 % lead, 2.0% copper, 1.0 oz/ton silver, and trace gold. Average grade of entire zone is 2.0% lead, 1.0% copper, 0.5 oz/ton silver, and traces of gold (Cater and others, 1973, p. 206).
103	Triple B prospect (T15N, R13E, sec. 8) Walt Mason	A shear zone trends N85°E in Tertiary dacite porphyry. No visible metallic minerals.	One caved adit.	A chip sample contained a trace gold and 1.3 oz/ton silver (Cater and others, 1973, p. 206).
104	Cougar Ranch placer (T16N, R13E, sec. 7)	A gravel bar above the mouth of Cougar Creek covers 25 acres.	Unknown.	An estimated 1,600,000 yd^3 of gravel is present. Samples from four sites had gold values ranging from a trace to 17.8 cents/yd^3 (gold at $47.85/oz). Black sand ranged from 0.7 to 3.2 lb/yd^3 (Cater and others, 1973, p. 287, 293).
105	Biggs Ranch placer (T16N, R14E, sec. 23)	Alluvial material, covering 27 acres, ranges in size from sand to 2-ft boulders.	Unknown.	Estimated 780,000 yd^3 of alluvium. Samples from three test pits contained traces of gold and up to 1.1 lb/yd^3 black sand (Cater and others, 1973, p. 205).
106	Good Enough group (T16N, R14E, sec. 14)	Narrow iron-oxide-shear zones are in quartz diorite or diorite. Pegmatite and quartz veins occur throughout the locality. A 3.0 in. wide shear zone strikes N80°E and dips 75°NW at the portal.	One 15 ft adit and some cuts.	A sample from portal of adit contained trace gold and 0.2 oz/ton silver (Cater and others, 1973, p. 204).
107	White Quartz (T16N, R14E, sec. 14)	A 2- to 3-ft-wide by 110-ft-long quartz vein strikes N45°W in pink granite.	One pit.	Samples of vein contained no values (Cater and others, 1973, p. 204).
108	Burn Creek prospect (T16N, R14E, sec. 24)	A 2-ft wide quartz vein strikes N20°E and dips 10°NW in granitic rock. Vein is white brecciated quartz with disseminated pyrite.	One 20 ft adit, two caved adits, and four pits.	Samples across the vein averaged 0.3 oz/ton silver, 0.01% copper, and traces of gold (Cater and others, 1973, p. 203).
109	Black Nugget prospect (T16N, R14E, sec. 24)	A mineralized vertical shear zone about 0.2 ft wide in granitic rock contains chalcopyrite and malachite in calcite and quartz.	A 45-ft adit and one pit.	A chip sample along 28 ft of vein contained trace gold, 0.1 oz/ton silver, and 0.02% copper (Cater and others, 1973, p. 204).
110	Can't Savie prospect (T16N, R15E, sec. 19)	A pit exposes iron-oxide-stained andesite of the Challis Volcanics.	One pit.	Samples contain no significant amounts of economic minerals (Cater and others, 1973, p. 204).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
111	Valentine group (T16N, R15E, sec. 19)	A quartz vein from 0.1- to 1.2-ft thick trends N87°E and dips 45°-57°NW in black schist. The vein contains pyrite, chalcopyrite, minor azurite, and bornite.	A 114-ft-long adit, a 17-ft-deep shaft, and numerous pits.	Chip samples taken across the vein contained traces of gold, 0.16 to 17.70 oz/ton silver and 0.03% to 5.95% copper (Cater and others, 1973, p. 203).
112	Falconberry Ranch placer (T16N, R14E, sec. 25)	Alluvium, covering 44 acres, ranges in size from sand to 2-ft boulders and forms two terraces along the western side of Loon Creek.	None	An estimated 860,000 yd^3 of alluvium: samples contained up to 1.0 cent/yd^3 gold (gold at $47.85/oz) and a maximum of 1.8 lb/yd^3 black sand. Bed rock was not reached because of the high water table (Cater and others, 1973, p. 205).
113	Jack Creek prospect (T16N, R14E, sec. 27)	A network of 0.02- to 0.5-ft-wide quartz veins, up to 10-ft long, occur in pink, heavily iron-oxide-stained granite.	None.	A chip sample from the veins contained traces of gold and 0.2 oz/ton silver (Cater and others, 1973, p. 205).
114	Prospect (T15N, R9E, sec. 16)	A 5-ft-thick, 10-ft-long, hydrothermally-altered shear zone strikes N25°W, dips 70°NE, and contains a 1-ft-thick, discontinuous zone of massive, white quartz in granodiorite host rock.	Two collapsed adits, 30 ft and 10 ft long.	One grab sample of altered host rock and quartz: 0.122 oz/ton gold and 3.9 oz/ton silver; one chip sample across shear zone: no gold or silver detected (Ridenour, 1985, p. 134, fig. 20, no. 1).
115	Prospect (T15N, R9E, sec. 14)	A fracture zone 2.9 ft thick strikes N45°W, dips 69°NE, and contains minor iron-oxide stains in porphyritic granodiorite host rocks.	One inclined shaft caved at 30 ft.	One chip sample of fracture zone material and one grab sample of altered host rock: no gold or silver was detected (Ridenour, 1985, p. 134, fig. 20, no. 2).
116	Mine (T15N, R9E, sec. 14)	A 10-in.- to 1.3-ft-thick zone strikes N35°-50°E and dips 60°SE in porphyritic granodiorite intruded by Tertiary dacite dikes. Fault zone exposed in a 20-ft-long drift strikes N65°W and dips 87°NE and contains pyrite.	One adit 586-ft long, one caved adit over 30-ft long, and four pits. There is evidence of production, although none has been recorded.	Eleven chip samples and four grab samples: one chip and one grab sample of quartz vein material contained 0.01 oz/ton gold and one chip sample from drift contained 0.038 oz/ton gold; five chip samples of shear zone material yielded silver values ranging from 0.2 to 1.8 oz/ton and one grab sample of altered quartz yielded 2.1 oz/ton (Ridenour, 1985, p. 134, fig. 20, no. 4).
117	Silver Sue (Bacon and Beans, etc) (T15N, R9E, sec. 14) Robert L. Whaley	Intersection between two joint sets in silicified, decomposed granodiorite. Joints strike N62°E and N67°E and dip 73°NW and 40°SE. Pyrite and galena are visible in host rock and dump material at the Bacon and Beans site only.	Three caved adits estimated to total 80 ft long; five small pits.	Three chip, two grab, and one select sample: one chip sample contained 0.1 oz/ton gold and four samples yielded 0.3, 3.2, 4.6, and 27.4 oz/ton silver; the highest silver value was derived from a select grab sample of high-grade dump material (Ridenour, 1985, p. 134, fig. 20, no. 3) .
118	KW prospect (T16N, R9E, sec. 36)	A vertical fault strikes N72°W in quartz monzonite. The fault zone is up to 4 ft wide and consists of vuggy white quartz containing galena and pyrite.	Two caved adits, and one pit.	A chip sample across the fault zone contained 0.11 oz/ton gold, 20.4 oz/ton silver, and 2.9% lead (Cater and others, 1973, p. 224).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
119	Cougar mine (T16N, R9E, sec. 36) Electronic Metals, Inc.	A fault zone averaging 3.8 ft wide, strikes N55°W and dips 65°NE in quartz monzonite and quartzite. Breccia along the fault is iron-oxide stained with a few white quartz stringers. Quartz vein material from dumps has pyrite, arsenopyrite, galena, azurite, and limonite.	An adit 780-ft long, a caved adit, and one pit. 183 oz gold, 483 oz silver, and 341 lb lead were recovered from a small tonnage of oxide ore taken from surface pits between 1936 and 1938 (Fisher and Johnson, 1987, p. 127) (Cater and others 1973, p. 219).	An estimated 5,000 tons of resources averaging 0.3 oz/ton gold, 1.10 oz/ton silver, and traces of lead. Three samples from dumps contained 0.3 to 0.66 oz/ton gold and 1.16 to 2.38 oz/ton silver. Twenty-five underground samples ranged from a trace to 0.39 oz/ton gold and from a trace to 0.76 oz/ton silver (Cater and others, 1973, p. 219).
120	Franklin D. mine (T15N, R10E, sec. 6) (Tom Bonn)	A fault zone in quartz monzonite strikes N49°-62°W and dips from 80°NE to vertical. The fault zone can be traced for 1,200 ft and has an average width of 3.5 ft. The fault zone has iron-oxide-stained breccia and some irregular quartz veins containing anglesite.	Three adits and several pits.	An estimated 81,000 tons of resources averaging 0.59 oz/ton gold and 4.48 oz/ton silver. Fifty-three samples contained gold ranging from a trace to 2.19 oz/ton and silver ranging from trace to 11.8 oz/ton (Cater and others, 1973, p. 214).
121	Coleman prospect (T15N, R10E, sec. 6)	A 2-ft-wide fault zone strikes N30°E dips vertically and is discontinuously exposed for 120 ft in granitic rocks. The fault zone contains iron- and manganese-oxide stained breccia with irregular fracture filling of white, sugary-textured quartz. Pyrite and galena are in stockpiled quartz.	An adit caved 60 ft from the portal and one open cut.	Samples contained a trace to 0.36 oz/ton gold and 0.6 to 1.0 oz/ton silver and a maximum of 0.52% lead (Cater and others, 1973, p. 223)
122	Lucky Ladd mine (T15N, R10E, sec. 5)	A steeply dipping fault zone, 0.5 to 4 ft wide, strikes N70°W in quartz monzonite of the Idaho batholith. Ore minerals include galena, anglesite, pyrite, chalcopyrite, and limonitic boxworks.	Four adits. Production between 1935 to 1945 was 1,309 oz gold, 24,165 oz silver, 2,897 lb copper, and 332,716 lb lead (Fisher and Johnson, 1987, p. 127).	Several hundred tons of resources averaging 1 oz/ton gold, 7.6 oz/ton silver, and 8% lead is present. Four samples contained gold ranging from 0.20 to 1.6 oz/ton; silver from 0.53 to 11.0 oz/ton; and up to 12.7% lead and 0.04% copper (Cater and others, 1973, p. 221).
123	Prospect (T15N, R10E, sec. 8)	Buff-colored rhyolite dike has minor iron-oxide stains.	One small pit.	One grab sample: 0.1 oz/ton silver; no gold detected (Ridenour, 1985, fig. 20, no.5, p. 134).
124	Golden King prospect (T15N, R10E, sec. 17)	Discontinuous fracture zones strike N30°-40°E and dip 56°-68°SE in porphyritic granodiorite cut by rhyolite and dacite dikes. Very minor pyrite and boxwork in quartz vein material was noted on the dump.	Four pits.	Three chip samples and three grab samples: two grab samples of quartz vein material yielded 0.01 oz/ton gold; two chip and two grab samples of quartz and altered dike rock contained 0.1 and 0.2 oz/ton silver, respectively (Ridenour, 1985, p. 134, fig. 20, no. 6).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
125	Geothermal location (T15N, R10E, sec. 21)	A geothermal spring discharges at the rate of 3 gallons per minute from granite bedrock (Ross, 1971, p. 49, no. 45).	Unknown.	None.
126	Prospect (T15N, R10E, sec. 15)	Three discontinuous shear zones in granodiorite host rock with the following measurements: 70 ft long and 6 ft thick, strike N10°W, dip 70° NE; and 45 ft long and 3.5 ft thick, strike N60°W, dip 85°SW. Disseminated pyrite and boxworks occur sporadically in silicified dacite porphyry in contact with granodiorite.	One adit 30 ft long, one pit 10 ft long, and one cut 18 ft long.	Three chip samples from shear zones: two contained 0.678 and 0.05 oz/ton gold; two contained 0.2 and 1.6 oz/ton silver (Ridenour, 1985, p. 134, fig. 20, no. 7).
127	Powerhouse Bar placer (T15N, R10E, sec. 15)	A 4.5 acre bar contains mainly coarse sand and cobble with up to 10% boulders, is loosely cemented, and contains almost no clay (Ridenour, 1985, p. 179).	Unknown.	Estimated volume of this bar could not be determined from available exposures. Samples from the bar averaged 0.00001 oz/yd^3 gold (Ridenour, 1985, p. 181).
128	Prospect (T15N, R10E, sec. 14)	Shear zone strikes N5°W and dips 60°NE in granodiorite, is approximately 20 ft long and 2.5 ft thick and contains visible pyrite, arsenopyrite, sphalerite, and galena.	One adit 22 ft long.	One chip sample: 0.133 oz/ton gold and 1.3 oz/ton silver (Ridenour, 1985, p .135, fig. 20, no. 8).
129	Prospect (T15N, R10E, sec. 22)	Quartz float contains less than 1% pyrite, minor galena, and arsenopyrite. Host rock in the area is silicified porphyritic dacite.	One caved adit and a trench 30 ft long.	One grab sample of quartz: 0.046 oz/ton gold and 0.6 oz/ton silver (Lowe and others, 1983, appendix, no. 1).
130	Deer Horn Creek Bar placer (T15N, R10E, sec. 22)	A 6.5 acre bar contains primarily coarse sand to cobble size material with up to 10% boulders, is loosely cemented, and contains almost no clay (Ridenour, 1985, p. 179).	Unknown.	An occurrence of 119,000 yd^3 of gravel contains 0.00011 oz/yd^3 gold (Ridenour, 1985, p. 181).
131	Snowslide prospect (T15N, R10E, sec. 23)	A 2- to 4-ft-thick quartz-filled fissure vein strikes N55°W and dips 60°NE for about 110 ft in granodiorite. Moderately disseminated to massive pyrite sporadically occurs in veinlets or pods within the fissure vein.	One adit 5 ft long, one caved adit, one 15-ft deep shaft, and one small cut.	Two chip samples of quartz: 0.160 and 0.028 oz/ton gold; one contained 0.2 oz/ton silver. One grab sample of massive pyrite: 0.748 oz/ton gold, 1.8 oz/ton silver, 1.48% lead, and 0.76% zinc (Lowe and others, 1983, appendix, no.2).
132	Joe Bump Bar placer (T15N, R10E, sec. 23)	Material in bar is primarily coarse sand to cobble size with up to 10% boulders, is loosely cemented, and contains almost no clay. The bar averages about 6-ft thick. Fine to very-fine sized gold is fairly uniformly distributed throughout all samples and layers of enrichment were not identified (Ridenour, 1985, p. 179-181).	Unknown.	Joe Bump Bar has 33,000 yd^3 of inferred, subeconomic resources, valued at $2.44 per yd^3 (gold at $400/troy oz) (Ridenour, 1985, p. 188).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
133	Sheepeater Bar placer (T15N, R10E, sec. 24)	Material in the bar is mainly coarse sand to cobble size with up to 10% boulders, is loosely cemented, and contains almost no clay. The bar averages about 6-ft thick. Perched gravel occurs 100 ft above river level (Ridenour, 1985, p. 179-181).	Unknown.	An occurrence of 212,000 yd^3 of gravel contains 0.00003 oz/yd^3 gold (Ridenour, 1985, p. 181). Sheepeater Bar has sufficient volume to support a large-scale placer operation should additional sampling indicate areas of higher grade within that bar.
134	Sheepeater Hot Spring (T15N, R10E, sec. 24)	Geothermal springs discharge about 25 gallons per minute near the Middle Fork of the Salmon River (Ross, 1971, p. 49, no. 44). This low temperature geothermal system is probably controlled by faults and joints in granitic bedrock.	Unknown.	None.
135	Prospect (T14N, R9E, sec. 3)	The contact between granodiorite and a Tertiary rhyolite dike strikes N65°E and dips 75°SE. Rocks are moderately silicified and iron-oxide stained.	One caved adit, one shallow shaft, and one pit.	Two chip samples and one grab sample of silicified host and dike rock: one chip sample yielded 0.1 oz/ton silver; no gold detected (Ridenour, 1985, p. 136, fig. 20, no. 16).
136	Prospect (T14N, R9E, sec. 3)	Northwest-trending rhyolite and dacite dikes cut granodiorite host rock. Minor quantities of pyrite, hematite, malachite, and vuggy quartz occur in argillically altered fracture zones.	One shallow shaft and 29 pits.	Six chip samples and two grab samples: three chip samples of silicified host and dike rock yielded 0.2, 0.3, and 0.4 oz/ton silver, and one grab sample of altered granodiorite contained 1.9 oz/ton silver; no gold was detected (Ridenour, 1985, p. 136, fig. 20, no. 17).
137	Prospect (T14N, R9E, sec. 10)	A 6-ft-thick argillized zone strikes N5°E and dips 89°NW in granodiorite. Quartz veinlets present in zone.	One pit.	One chip sample: no gold or silver detected (Ridenour, 1985, p. 136, fig. 20, no. 18).
138	Robin prospect (T14N, R9E, sec. 11)	Vertical joints strike due east in silicified granodiorite and contain quartz-filled vugs with minor pyrite and galena.	One small pit.	One chip sample and one grab sample: both yielded 0.01 oz/ton gold and 0.5 and 0.7 oz/ton silver, respectively (Ridenour, 1985, p. 136, fig. 20, no. 19).
139	KG prospect (T14N, R9E, sec. 10)	A 100-ft-long, discontinuously exposed contact between silicified granodiorite and a dacite dike strikes N30°E and dips 70°SE. Visible pyrite, arsenopyrite, galena, malachite, and azurite occur sporadically in the contact zone and on fracture and joint surfaces.	Three small pits.	Three grab samples and one chip sample of silicified host rock: one grab sample yielded 0.01 oz/ton gold, three grab samples contained 2.0, 2.1, and 8.9 oz/ton silver, and one chip sample had 1.0 oz/ton silver. All contained 0.094% to 0.244% copper (Ridenour, 1985, p. 136, fig. 20, no. 20).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
140	Geothermal location (T14N, R9E, sec. 13)	Three hot springs on Sulphur Creek discharge 7 gallons of water per minute at a temperature of 80 °F to 110 °F. This low temperature geothermal system is probably controlled by faults or joints in granite of the Idaho batholith (Waring, 1965, p. 27, no. 43).	Unknown.	None.
141	Prospect (T14N, R10E, sec. 18)	A 1- to 1.5-ft-thick shear zone with quartz strikes N50°E and dips 67°SE in silicified granodiorite cut by a dacite dike swarm. Minor amounts of sulfides and copper minerals occur in the shear zone.	One caved adit and one adit 80 ft long.	Four chip samples across shear zone: three yielded 0.2, 1.0, and 1.4 oz/ton silver; three contained 0.042%, 0.093%, and 0.185% copper. One grab sample of quartz vein material: 0.4 oz/ton silver, no gold detected (Ridenour, 1985, p. 135, fig. 20, no. 15).
142	Geothermal location (T14N, R10E, sec. 29)	A hot spring discharges about 2 gallons of water per minute on the Middle Fork of the Salmon River. This low temperature geothermal system may be controlled by faults in the underlying granite of the Idaho batholith (Waring, 1965, p. 27, no. 42).	Unknown.	None.
143	Hardscrabble group (T15N, R11E, sec. 16)	Quartz monzonite of the Idaho batholith is cut by a network of shears and fractures. The main structure is about 2 ft wide and trends N5°E for about 1,400 ft. Ore minerals include sphalerite, galena, and chalcopyrite. The structure is a possible extension of those on the Ramshorn prospect 0.5 mi to the south (Cater and others, 1973, p. 198-199).	One 15-ft adit, four caved adits from 50 to 100 ft long, and three pits. A small quantity of ore was reportedly packed to the Greyhound smelter (Cater and others, 1973, p. 198).	Samples contained an average of trace gold, 0.9 oz/ton silver, 0.1% copper, 0.9% lead, and 0.7% zinc (Cater and others, 1973, p. 198).
144	Bell Creek placers (T15N, R11E, sec. 11)	Gravel is along the lower reaches of Bell Creek. The area contains relatively small amounts of placer material.	None.	Several nuggets were reportedly found, but panning revealed only a few minute colors (Cater and others, 1973, p. 202).
145	Outlook prospect (T15N, R11E, sec. 16)	A 0.5 ft wide vertical quartz vein strikes due north for 65 ft in granitic rock.	Three pits.	Samples contained no economic metal values (Cater and others, 1973, p. 199).
146	Ramshorn prospect (T15N, R11E, sec. 21)	A network of fractures form replacement and fissure-filling veins from 0.2 to 0.5 ft wide that can be traced for 240 ft on the surface. The veins contain chalcopyrite, pyrite, and argentiferous galena in white quartz.	A caved adit, a shaft, two trenches, and five pits. A small quantity of ore was reportedly packed out (Cater and others, 1973, p. 195).	Three samples were taken. Two grab samples had 4.3 and 10.1 oz/ton silver, 0.22 and 0.24 oz/ton gold, and 0.24% and 0.42% copper. A chip sample contained 0.23 oz/ton gold, 7.1 oz/ton silver, and 0.30% copper (Cater and others, 1973, p. 197).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
147	West Side prospect (T15N, R11E, sec. 21)	Steeply dipping fractures in alteration zones strike N25°W. The 0.1- to 0.2-ft-wide fractures in granitic rock are filled with iron-oxide-stained quartz.	Two pits.	A select sample contained traces of gold and 8.3 oz/ton silver (Cater and others, 1973, p. 199).
148	Columbus prospect (T15N, R11E, sec. 21)	A 0.5-ft-wide, iron-oxide-stained quartz vein occurs in granitic rock.	Three pits.	Samples contained no economic metal values (Cater and others, 1973, p. 199).
149	Snowstorm group (T15N, R11E, sec. 24)	Pits failed to expose a northwestern extension of the Blackjack shear zone.	Several pits.	Samples contained no significant amounts of metals (Cater and others, 1973, p. 202).
150	Blackjack mine (T15N, R11E, sec. 24) Elmer Ogren	A mineralized shear zone is about 5-ft thick and cuts a roof pendant of interbedded marble and shale. The shear strikes N38°W, and dips 75°NE and is exposed discontinuously for 2,200 ft. Pods and lenses of quartz and calcite in the shear zone contain oxidized silver and lead sulfide minerals.	Three adits and seven pits. Production was 2,610 tons of ore which assayed 0.06 oz/ton gold, 41.3 oz/ton silver, 34.1% lead, and 5.8% zinc (Cater and others, 1973, p. 199-200).	Estimated resources are 2,000 tons of shear zone material which averages 3.4% zinc and 1.17% lead, and 700 tons of quartz vein material averaging 0.087 oz/ton gold, 9.21 oz/ton silver, 0.08% copper, 3.7% lead, and 3.5% zinc. Nineteen samples were taken. Samples contained as much as 31.3 oz/ton silver, 13.2% lead, and 6.2% zinc (Cater and others, 1973, p. 199).
151	Idaho prospect (T15N, R12E, sec. 19)	Gossan is in a zone of cross-fracturing associated with lamprophyre dike which strike N30°W and dip vertically. The dikes contain minute veinlets of pyrite.	Five pits.	Random samples of gossan contained trace gold, silver, and lead (Cater and others, 1973, p. 202).
152	Republican group (T15N, R11E, sec. 32)	The vein on the Republican group (Idaho, Bulldog, Logan, and Buckhorn patented claims) is probably an extension of the Greyhound vein. A 2.5 ft wide shear zone strikes N55°W and dips vertically to 65°SW. It is composed of crushed and sericitized granite cemented by bluish quartz containing finely disseminated sulfides. Identified minerals include galena, sphalerite, pyrrhotite, arsenopyrite, chalcopyrite, and pyrite.	Pits, discovery shafts, small adits; the largest is a 61-ft adit on the Bulldog claim. A small amount of ore was reportedly taken from the Bulldog workings and smelted at the Greyhound mine in about 1905 (Cater and others, 1973, p. 194).	Thirty-two samples were taken. Values were as high as 4.7% lead, 30.5 oz/ton silver, 0.8% zinc, and 0.10 oz/ton gold. Average grade of the shear zone is estimated to be 0.006 oz/ton gold, 1.3 oz/ton silver, 0.01% copper, and 0.9% lead (Cater and others, 1973, p. 194-195).
153	Capitol State (T14N, R11E, sec. 5)	A parallel or subsidiary structure to the Republican-Greyhound shear zone has an iron-oxide-stained soil zone. Bedrock was not exposed.	Two pits.	A grab sample from a dump contained trace gold and 6.5 oz/ton silver (Cater and others, 1973, p. 196-198).
154	Porphyry Peak prospect (T15N, R11E, sec. 33)	A 2-ft-wide vertical lamprophyre dike strikes N30°W in granitic rock.	One trench.	No economic minerals were observed and assays showed no mineral values (Cater and others, 1973, p. 196).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
155	Dowling Quartz prospect (T15N, R11E, sec. 33)	A vertical shear zone strikes N55°W in granitic rock. The shear zone ranges from 0.5 to 3.5 ft wide and contains pyrite, argentiferous galena, chalcopyrite, and quartz.	Two adits (one caved) and three pits.	Six samples were taken. One chip sample contained 7.67 oz/ton silver, and a select sample from the dump had 59.8 oz/ton silver (Cater and others, 1973, p. 195).
156	Brown Bear prospect (T15N, R11E, sec. 34)	An iron-oxide-rich shear zone in granitic rock strikes north and dips vertically. The 0.3-ft-wide shear zone contains disseminated sulfides in quartz.	Four pits.	A sample contained 0.03 oz/ton gold and 6.5 oz/ton silver (Cater and others, 1973, p. 198).
157	Moonshine prospect (T15N, R11E, sec. 34)	An attempt to cut an extension of the Brown Bear shear zone exposed no mineralized structures or bedrock.	One trench.	Samples contained 1.3% lead (Cater and others, 1973, p. 198).
158	Prospect (T14N, R11E, sec. 4)	A northwest-striking quartz vein with pyrite is in quartz monzonite with some metasedimentary xenoliths.	One 11-ft adit.	Four samples were taken: no gold or silver was detected (Lowe and others, 1983, appendix, no. 13).
159	Prospect (T14N, R11E, sec. 4)	Quartz monzonite has minor quartz veins and minor argillic alteration.	Two pits.	Two samples were taken: no gold or silver was detected (Lowe and others, 1983, appendix, no. 11).
160	Prospect (T14N, R11E, sec. 4)	Quartz veins are in quartz monzonite.	One 35-ft trench.	One sample taken: no gold or silver was detected (Lowe and others, 1983, appendix, no.12).
161	Prospect (T14N, R11E, sec. 4)	A quartz vein is in quartz monzonite.	One caved adit.	One sample: 0.4 oz/ton silver and no gold was detected (Lowe and others, 1983, appendix, no. 10).
162	Greyhound mine (T14N, R11E, sec. 4) Dan Yanke, Boise, ID	Ore shoots, containing argentiferous galena and sphalerite, occur along a structure striking N60°W and dipping 70°SW. The mineralized structure is about 14,000 ft long in granitic host rocks of the Idaho batholith.	Numerous adits and pits. Recorded production was 42 oz gold, 13,148 oz silver, 682 lb copper, 10,865 lb lead, and 45,511 lb zinc (Fisher and Johnson, 1987, p. 102).	Ore zone is reported to contain 20 to 40 oz/ton silver, 2% to 4% lead, and 3% to 4% zinc. Gold is associated with arsenopyrite. Current efforts (1988) are to develop base metals with silver resources in areas of less arsenopyrite (Lowe and others, in preparation).
163	Prospect (T14N, R11E, sec. 5)	Slight iron staining is in quartz monzonite.	One small pit.	One sample: no precious or base metals were detected (Lowe and others, 1983, appendix, no. 6).
164	General Grant prospect (T14N, R11E, sec. 4)	A fissure vein striking N15°W and dipping 70°SW is filled with crushed an sericitized granite and cemented with quartz. Pyrite was the only sulfide observed.	One adit. A little ore was mined, and apparently some of it was treated at the portal in a miniature furnace (Ross, 1930, p. 5).	None.
165	Prospect (T14N, R11E, sec. 9)	Quartz monzonite is deeply weathered.	Possible caved adit.	One select grab sample: no gold and 0.2 oz/ton silver was detected (Lowe and others, 1983, appendix, no. 7.

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
166	Prospect (T14N, R11E, sec. 2)	A skarn zone with iron oxides and pyrite is cut by numerous dikes in quartz monzonite.	One pit.	Two samples: no precious metals were detected in one sample; an 80-ft chip sample contained 0.2 oz/ton silver (Lowe and others, 1983, appendix, no. 17).
167	Shiney B No. 13 (T14N, R11E, sec. 1)	Schist is enclosed in a dike in quartz monzonite. Indications of sulfide oxidation is present.	None.	One sample: no gold, silver, lead, or zinc were detected (Lowe and others, 1983, appendix, no. 18).
168	Opal Creek placer (T15N, R11E, sec. 36) Elmer Ogren	A flat-topped terrace is about 40 ft above the river bed of Rapid River. Alluvium ranges from sand-size to 2-ft-diameter boulders.	Two large pits.	Channel samples down the pit wall contained an average of $\$.08$ gold/yd^{3} (Cater and others, 1973, p. 202).
169	Bacon group (T15N, R11E, sec. 25)	Mineral deposits were formed by fissure filling and replacement in shear zones throughout a poorly exposed marble roof pendant. Average thickness of quartz veins within shear zones is 0.5 ft.	Three adits (one caved) and three large trenches.	Estimated 38,000 tons of resources. Average tenor of high-grade material from stockpile and dumps is 0.26 oz/ton gold, 9.6 oz/ton silver, 0.42% copper, 6.61% lead, and 14.49% zinc. Two 8-ft-long samples across shear zones contained 0.29 and 0.47 oz/ton gold, 2.1 and 1.3 oz/ton silver, 0.01% and 0.46% copper, 0.17% and 0.85% lead, and 0.04% and 1.02% zinc (Cater and others, 1973, p. 189).
170	Lead-Metals group (T15N, R12E, sec. 30)	A 1.5 to 4 ft thick shear zone trends N37°W, dips 20°-50°SW in a sequence of dolomitic marble and quartzite. Sulfide-rich stringers and veinlets are within brecciated parts of the shear zones. Minerals include white quartz with galena, pyrite, sphalerite, and minor chalcopyrite and bornite.	Two flooded adits, two caved adits, a shaft, and a few surface cuts. Empire Exploration, Inc. made a shipment of sorted dump material in 1969 (Cater and others, 1973, p. 185)	Samples taken across the shear zone averaged trace gold, 2.56 oz/ton silver, 0.06% copper, 2.0% lead, and 0.24% zinc (Cater and others, 1973, p. 187).
171	Lemp group (T15N, R12E, sec. 31)	Shear zone trending N60°W is in quartz monzonite. A diorite porphyry dike parallels the shear zone.	One caved shaft, a caved adit, a trench, and an open cut. There was probably some pre-1900 production, but none was recorded (Cater and others, 1973, p. 189-190).	A select sample from a stockpile contained trace gold, 0.2 oz/ton silver, 0.01% lead, and 0.01% copper (Cater and others, 1973, p. 190).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
172	Mountain King mine (T15N, R12E, sec. 29) Martin T. Fleming	The principal structure is a siliceous replacement vein 2 to 8 ft thick, striking N76W and dipping 48S in a sedimentary roof pedant overlying granitic rock. The vein contains argentiferous galena, pyrite, sphalerite, and chalcopyrite in a quartz gangue.	Five caved adits, one trench, and five shallow pits. Underground workings total 1,650 ft in length. In 1884, two shipments to the Ketchum smelter amounted to 5.75 tons and contained 1,067.28 oz silver and 5,049 lb lead. In 1890 and 1892, shipped ore amounted to 71.85 tons and contained 6,579.12 oz silver and 79,601 lb lead (Ross, 1930, p. 6). Since 1900 production amounted to 159 oz gold, 60,534 oz silver, 12,744 lb copper, 728,222 lb lead, and 758,260 lb zinc (Fisher and Johnson, 1987, p. 127).	An estimated 60,000 tons of resources containing gold, silver, lead, zinc, and copper. Twenty-three samples contained 0.15 to 28.0 oz/ton silver, trace to 0.2 oz/ton gold, trace to 50.2 lead, and trace to 12.7% zinc. Cadmium in one sample was 0.07% (Cater and others, 1973, p. 180-181).
173	Mahan prospect (T15N, R12E, sec. 32)	Silicified limestone, intruded by a mafic dike, is surrounded by granodiorite	Two shallow pits.	Three samples: no gold or silver detected; one grab sample of limestone had 0.04% copper (Ridenour, 1985, p. 74, no. 79).
174	Prospect (T15N, R12E, sec. 29)	A quartz fissure vein is in a rhyolite dike in granodiorite.	One caved adit, estimated at <50 ft long.	One grab sample: no gold or silver was detected (Ridenour, 1985, p. 74, no. 78).
175	Badger lode (T15N, R12E, sec. 28)	Gossan contains traces of bornite and chalcopyrite in quartz.	One pit.	One sample contained trace gold, 0.2 oz/ton silver, 0.01% lead, and 0.01% copper (Cater and others, 1973, p. 190-191).
176	Old Timer prospect (T15N, R12E, sec. 33)	Tertiary dacite and a few schist xenoliths contain stockworks of numerous 1/4- to 1-in.-thick veinlets of pink rhodochrosite.	Three pits and one trench.	The amount of rhodochrosite present is negligible, and the deposit should not be considered as a potential manganese resource (Fisher and Johnson, 1987, p. 152). No silver or lead was detected (Cater and others, 1973, p. 191).
177	Prospect (T15N, R12E, sec. 34)	Quartz vein material contains pyrite, sphalerite, and galena, some calcite, and sulfide boxworks; vein is hosted by dacite(?) porphyry.	One caved adit, estimated at <50 ft long, three shallow pits, one caved shaft, and one sloughed trench.	Three grab samples: a trace of gold, 0.4 to 54 oz/ton silver, 0.73% to 2.51% lead, and 0.83% to 10.4% zinc (Leszcykowski and others, 1983, appendix, no. 7; Ridenour, 1985, p.).
178	Prospect (T15N, R12E, sec. 33)	A quartz vein, about 2-ft wide, trends N28°W, dips 49°NE, and cuts siliceous, dolomitic limestone. The quartz is lightly iron-oxide stained.	One 30-ft-long adit, one caved adit estimated at less than 15-ft long.	Three samples: one chip sample contained 0.014 oz/ton gold and 0.2 oz/ton silver; two grab samples, one contained 0.168 oz/ton gold and 1.5 oz/ton silver. No gold or silver was detected in a second sample (Leszcykowski and others, 1983, appendix, no. 6; Ridenour, 1985, p. 74, no. 77).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
179	16-to-1 prospect (T14N, R12E, sec. 4)	Small pendants of limestone are hosted by granodiorite.	One caved adit estimated at <50 ft long, several bulldozer trenches and small pits.	Five samples: no gold detected; two contained 0.3 oz/ton and 0.5 oz/ton silver, three contained 0.02%, 0.18%, and 0.80% lead and 3.2%, 0.04%, and 0.11% zinc (Leszcykowski and others, 1983, appendix, no. 5; Ridenour, 1985, p. 74, no. 80).
180	16-to-1 patented claims (T14N, R12E, sec. 5)	A limestone pendant is in granodiorite.	One 10-ft-long adit, one caved adit estimated at 150-250 ft long; five bulldozer trenches, one shallow pit.	Five samples: no gold detected; two contained 0.3 oz/ton silver, three contained from 0.02% to 0.41% lead, and 0.01% to 1.4% zinc (Leszcykowski and others, 1983, appendix, no. 4; Ridenour, 1985, p. 74, no. 81).
181	Old Soldier No. 1 prospect (T14N, R10E, sec. 12)	A 2- to 7-ft thick discontinuous shear zone containing chloritic, argillic, and silicic alteration, strikes N40°-50°W and dips 80°NE to vertical. Host rock is a gneissic roof pendant intruded by granodiorite and dacite.	Three caved adits totalling approximately 45 ft, and five pits.	Nine chip samples and one grab sample of shear zone material: three chip samples yielded 0.06, 0.16, and 0.56 oz/ton gold, and two had a trace of gold; three contained 0.5, 1.2, and 9.7 oz/ton silver (Lowe and others, 1983, appendix, no.33; Ridenour, 1985, p. 135, no. 11).
182	Old Soldier No. 2 prospect (T14N, R10E, sec. 12)	A 3- to 6-ft-thick discontinuous, hydrothermally altered shear zone strikes N10°-20°W and dips 60°-70°SW for 40 and 50 ft in granodiorite. Chloritic, argillic, and silicic alteration are present.	Two adits, 4 ft and 12 ft long.	Three chip samples: two samples from shear zone yielded 0.092 and 0.27 oz/ton gold, and 0.6 and 0.7 oz/ton silver (Ridenour, 1985, p. 135, no. 12).
183	Josephus Silver prospect (T14N, R11E, sec. 17) Charles and Estelle Biggers.	A silicified zone strikes N50°-55°W and dips 60°NE. in a gneissic roof pendant intruded by granodiorite. The zone is partly exposed for 350 ft.	Two caved adits, one shallow shaft, and seven pits.	Three chip samples and four grab samples: one chip sample from altered zone yielded 0.01 oz/ton gold and 1.2 oz/ton silver; one grab sample of altered gneiss yielded 0.02 oz/ton gold and 2.1 oz/ton silver (Ridenour, 1985, p. 135, no. 13).
184	Josephus group (Float Creek mine) (T14N, R11E, sec. 17) Charles & Estelle Biggers	Granodiorite float with iron- and manganese-oxide staining has scattered quartz veins with minute amounts of visible pyrite and galena. Landslide debris contains indications of highly mineralized material which has probably fallen from unknown locations on the walls of Float Creek valley.	One caved adit estimated to have been 50-ft long, four trenches, and 18 pits. In 1883, one of the open cuts reportedly yielded 8 tons of ore averaging 1,100 oz/ton silver (Ross, 1930, p. 4).	Eight samples: no gold or silver was detected in one chip sample; of seven grab samples five contained 0.01 to 0.09 oz/ton gold, and six contained 0.2 to 8.4 oz/ton silver (Lowe and others, 1983, appendix, no. 32).
185	Prospect (T14N, R11E, sec. 16)	Quartz fills a shear zone in granitic rock.	Two caved adits with a probable combined length of less than 75 ft, one trench, and one pit.	Three samples: no gold, silver, or copper were detected; one sample contained 0.01% lead and 0.02% zinc (Lowe and others, 1983, appendix, no. 31).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
186	Colleen No. 10 prospect (T14N, R11E, sec. 16)	A shear zone containing pyrite is in granodiorite with metasedimentary xenoliths. The zone strikes northwest.	One 40-ft adit.	Three samples: one chip sample contained 0.206 oz/ton gold and 1.2 oz/ton silver; another chip sample contained 0.02% zinc; a grab sample contained 0.4 oz/ton silver (Lowe and others, 1983, appendix, no. 29).
187	Colleen group (T14N, R11E, sec. 21)	Quartz-filled shear zones are in granodiorite.	Three adits total 566 ft in length.	Ten samples: two grab samples contained 0.08 and 0.128 oz/ton gold; two grab samples contained silver with 0.3 and 0.4 oz/ton; lead in seven samples ranged from 0.01% to 0.32%, two samples had 0.01% and 0.02% zinc; two samples had 0.02% copper (Lowe and others, 1983, appendix, no. 28).
188	Clark Colleen prospect (T14N, R11E, sec. 22) Andy Novosad	A mineralized shear zone strikes N35°-45°W in granodiorite. The shear zone has abundant iron-oxide, arsenopyrite, and quartz.	One 13-ft adit, two caved adits estimated >150 ft in total length, two trenches totalling 110 ft in length.	Eight chip and three grab samples: three samples contained 0.010, 0.020, and 0.044 oz/ton gold; seven samples contained 0.2, 0.6, 0.8, 1.6, 1.9, 20.3, and 22.2 oz/ton silver; two samples contained 0.13% and 2.01% lead; five samples contained 0.01, 0.01, 0.03, 0.05, and 1.92% zinc; copper in four samples ranged from 0.01% to 0.55%; a 2-ft chip sample contained 22.2 oz/ton silver and 1.92% copper (Lowe and others, 1983, appendix no. 27).
189	Silver Bell Extension prospect (T14N, R11E, sec. 20) Elmer Ogren	Northwest-striking, pyrite-bearing quartz veins and shear zones in granodiorite.	Three adits (two caved).	Five samples: one chip sample contained 0.035 oz/ton gold and 0.2 oz/ton silver; four grab samples contained 0.030, 0.122, 0.130, and 0.398 oz/ton gold, and <0.2, 0.9, and 0.4 oz/ton silver (Lowe and others, 1983, appendix, no. 34).
190	Silver Bell group (T14N, R11E, sec. 20) Elmer Ogren	A quartz-filled shear zone strikes N60°W in granodiorite. Silicified limestone xenoliths occur in the intrusive rock.	At least one caved adit, three pits or trenches (possible caved adits) totalling 100 ft in length, six small linear pits perpendicular to the main workings. About 750 ft of underground workings	Four samples: three select samples contained 0.006, 0.118, 0.242, 0.006, and 0.118 oz/ton gold; 5.3, 7.3, and 168.7 oz/ton silver; and 0.04%, 8.0%, and 51% lead. A random dump sample contained <0.005 oz/ton gold, 0.3 oz/ton silver, and 0.01% lead (Lowe and others, 1983, appendix, no. 35).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
191	Mountain Dew prospect (T14N, R11E, sec. 20)	Quartz veins and shear zones are in granodiorite. Veins striking northwest contain pyrite and galena.	Three caved adits, estimated from 120- to 250-ft long.	Four samples: a select sample contained 0.068 oz/ton gold, 7.9 oz/ton silver, and 1.23% lead; three random grab samples averaged 0.041 oz/ton gold, 4.43 oz/ton silver and 2.3% lead (Lowe and others, 1983, appendix, no. 36).
192	Star mine (T14N, R11E, sec. 21)	Steeply-dipping, silicified shear zones are in quartz monzonite. The main shear zone (Star Vein) strikes N6°W and is generally vertical. The shear is quartz-filled with a sulfide stringer.	Eight adits totalling 935 ft; three short, caved adits; nine small pits; and one 70-ft trench.	Forty-eight samples, 14 of which are from the "Star Vein", the remainder are from surrounding scattered pits and adits. Samples from the Star Vein contain a weighted average of 0.125 oz/ton gold, 4.26 oz/ton silver, 0.11% copper, 2.64% lead, and 0.968% zinc over an 86-ft length and a 2.9 ft width. Gold in the remaining 34 samples ranged from 0.058 to 0.502 oz/ton; silver ranged from 0.2 to 27.1 oz/ton. Copper, lead, and zinc were seldom detected (Lowe and others, 1983, appendix, no. 30).
193	Seafoam mine (T14N, R11E, sec. 21)	Mineralized zones are exposed through a vertical range of 300 ft and with a maximum length of 600 ft and consist of sheared and altered country rock with quartz stringers. The average trend is about N20°-30°W. Both the quartz and country rock contain disseminated pyrite which carries some gold and silver. Some galena and sphalerite are present. Country rock consists of more or less sheared, crushed, and altered granitic material.	Under ground workings total 2,300 ft in four adits on the Silver King claim. Production from the Seafoam (Silver King) mine was 210 oz gold, 1,510 oz silver, 435 oz copper, 11,243 lb lead, 16,000 lb zinc (Fisher and Johnson, 1987, p. 127) (Ross, 1930, p. 3)	Some ore shoots are reported to average 0.5 oz/ton gold, but most of the lode is much lower in grade (Ross, 1930, p. 3).
194	Prospect (T14N, R11E, sec. 21)	A quartz vein with pyrite is in granodiorite.	One pit.	One select grab sample: 0.074 oz/ton gold and 0.01% lead (Lowe and others, 1983, appendix, no. 25).
195	Wildgoat No. 3 prospect (T14N, R11E, sec. 33)	A 1- to 1.8-ft-wide, iron-oxide-stained, chloritized shear zone strikes N35°W and dips 55°-70°NE in siliceously altered granodiorite. Visible sulfide minerals are pyrite and galena.	Three pits.	Two chip samples and one select grab sample: no gold was detected; two contained 1.0 and 4.0 oz/ton silver (Lowe and others, 1983, appendix, no. 38).
196	Prospect (T14N, R11E, sec. 33) W.E. Cass; Fair-Cass Mining Co	A 1.5-ft-wide fault zone strikes N10°E, dips 45°SE, with chloritic alteration, calcification, and visible sulfide minerals. The host rock is friable, medium-grained granodiorite.	One 87-ft adit.	Two samples: one contained 0.042 oz/ton gold and 1.8 oz/ton silver (Lowe and others, 1983, appendix, no. 39).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
197	Prospect (T14N, R11E, sec. 21)	Heavily iron-stained silicified granodiorite.	One pit.	One sample: no gold or silver was detected (Lowe and others, 1983, appendix, no. 26).
198	Enterprise mine (T14N, R11E, sec. 22)	A shear zone in granodiorite is cut by lamprophyre dikes. Granodiorite contains xenoliths of argillite.	One 150 ft adit, one caved adit estimated <200 ft long.	One select grab sample and four chip samples: the select sample contained 0.052 oz/ton gold, 2.0 oz/ton silver, 0.27% lead, and 0.04% zinc; chip samples averaged <0.005 oz/ton gold, <0.2 oz/ton silver, 0.01% lead, and 0.05% zinc (Lowe and others, 1983, appendix, no. 24).
199	Seafoam placer (T14N, R11E, sec. 13)	Placer mining was conducted in alluvial gravels near the original settlement of Seafoam, near the present Seafoam Guard station, at the confluence of Vanity and Seafoam Creeks (Ross, 1930, p. 1).	Placer trenches and placer spoils are along benches and bars of Vanity and Seafoam Creeks.	None. (Lowe and others, 1983, appendix no. 22).
200	Lovenest prospect (T14N, R11E, sec. 13) Elmer Ogren	A northwest-trending, 5- to 20-ft-wide shear zone occurs in quartz monzonite along with mafic dikes and metasedimentary xenoliths.	One 20-ft-long adit, one 50-ft-long trench and seven pits.	Twelve samples (nine chip, three select): one select sample contained 2.6 oz/ton silver, 0.34% lead and 0.51% zinc; no gold was detected. Three chip samples contained an average of 0.06% zinc, no gold or silver was detected (Lowe and others, 1983, appendix, no. 19).
201	Prospect (T14N, R12E, sec. 18)	A metasedimentary xenolith is in quartz monzonite.	One 5-ft-long adit.	One grab sample: no gold or silver was detected (Lowe and others, 1983, appendix, no. 20).
202	Nessie No. 12 prospect (T14N, R11E, sec. 24) Roger Kuhn	A northwest-striking sulfide zone in quartz monzonite is cut by mafic dikes. The zone is greater than 160-ft long and 12-ft wide, and is exposed vertically for 50 ft. Pyrite, galena, and sphalerite are disseminated throughout.	Two adits, 160-ft and 25-ft long.	Twelve samples: two select samples contained 0.160 and 0.328 oz/ton gold, 2.8 and 50.0 oz/ton silver, 0.1 and 0.2% copper, 2.39% and 8.30% lead, and 0.03% and 2.40% zinc. Of ten chip sample, four averaged 0.325 oz/ton silver; nine samples analyzed for copper contained no more than 0.01% copper. Average lead and zinc content for the nine samples was 0.13% and 0.06%, respectively (Lowe and others, 1983, appendix, no. 21).
203	Prospect (T14N, R11E, sec. 26)	Steeply dipping, northwest-striking shear zones in granodiorite are filled with mineralized quartz veins.	Four caved adits, total length is estimated at 100 to 250 ft, one small prospect.	Six samples: two grab samples contained 0.20 and 0.864 oz/ton gold; two grab samples contained 1.0 and 3.0 oz/ton silver; one sample contained 1.86% lead and 0.01% zinc. One sample contained 0.01% antimony (Lowe and others, 1983, appendix, no. 46).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
204	Post mine (Lost Claim group) (T14N, R11E, sec. 22)	A sulfide-bearing shear zone striking N30°W is present.	Four caved adits, one 38-ft adit. An estimated 200 to 300 ft of total workings.	Five samples: Three grab samples contained 0.04, 0.064, and 0.132 oz/ton gold; 5.4, 23.4, and 45.0 oz/ton silver; 0.22%, 1.04%, and 1.28% lead; 0.06%, 0.12%, and 0.88% zinc. Two chip samples contained <0.005 and 0.018 oz/ton gold; 0.3 and 2.0 oz/ton silver; <0.01% and 0.09% lead; 0.08% and 0.06% zinc. One grab sample contained 0.13% antimony (Lowe and others, 1983, appendix, no. 45).
205	Prospect (T14N, R11E, sec. 23)	Disseminated sulfides are in silicified schist in granitic rock.	One pit	One chip sample contained 0.01% zinc; no gold, silver, or lead was detected (Lowe and others, 1983, appendix, no. 23).
206	Prospect (T14N, R11E, sec. 27)	A 3- to 5-ft-wide zone of chloritic alteration, striking N26°W, dipping 80°NE, is in phaneritic granodiorite with iron- and manganese-oxide staining. Localized quartz veins are apparently barren.	Two partly collapsed adits, 35 ft and 80 ft long, and eight pits.	Six samples: one contained 0.02 oz/ton gold; three contained 3.4 to 20.3 oz/ton silver (Lowe and others, 1983, appendix, no. 44).
207	Wild Goat No. 1 (T14N, R11E, sec. 27) Elmer Ogren	An iron-stained gouge zone, from 1- to 2-ft wide, strikes N10°-62°W and dips vertically. with disseminated pyrite and galena. Host rock is friable, silicified granodiorite.	One 70-ft adit and one small pit.	Four samples: no gold detected; three contained 0.2 to 2.4 oz/ton silver (Lowe and others, 1983, appendix, no. 43).
208	Prospect (T14N, R11E, sec. 27)	Zone of silicified rock from 2- to 4-ft wide, with three different attitudes (N5°E, vertical; N35°W, vertical; N60°E, 50°SE). The host rock is granodiorite.	Two small adits, 150- and 50-ft long.	Three samples: no gold detected; two contained 0.2 and 9.6 oz/ton silver (Lowe and others, 1983, appendix, no. 42).
209	Prospect (T14N, R11E, sec. 27)	A 1.5- to 5.5-ft-wide, altered shear zone striking N27°W, dipping 63°SW is in phaneritic granodiorite. Quartz veins up to 3-in. wide are present, but no ore minerals are visible.	Two small pits.	Three samples: no gold was detected,; one sample contained as much as 0.5 oz/ton silver (Lowe and others, 1983, appendix, no. 41).
210	Prospect (T14N, R11E, sec. 34)	A 2.5-ft-wide, massive quartz vein strikes N18°W, dips 78°SW in granodiorite. No ore minerals were seen.	One small pit.	One sample: 0.2 oz/ton silver (Lowe and others, 1983, appendix, no. 40).
211	MIA No. 22 prospect (T14N, R11E, sec. 35) Ray Bohn	A quartz vein is in granodiorite with marble and schist xenoliths. Pyrite and possible molybdenite is present.	One small pit.	One sample: 0.01% copper, and 0.01% zinc; no gold, silver, or lead was detected (Lowe and others, 1983, appendix, no. 52).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
212	Gold occurrence (T13N, R12E, sec. 6)	Metasedimentary xenoliths are in quartz monzonite. Sulfides include pyrite, arsenopyrite, and sphalerite.	One adit and several pits.	Three samples were taken: two chip samples contained nil and 0.02 oz/ton gold and 0.2 and 0.8 oz/ton silver. A grab sample from the dump had 0.042 oz/ton gold and 0.2 oz/ton silver (USBM, 1988).
213	MIA No. 29 prospect (T14N, R11E, sec. 35) Ray Bohn	A northwest-striking quartz vein cuts granodiorite containing marble xenoliths.	One pit or trench.	One sample was taken: no gold or silver was detected (Lowe and others, 1983, appendix, no. 53).
214	MIA No. 22 prospect (T14N, R11E, sec. 35) Ray Bohn; Northwest Minerals Development Corporation	A quartz vein with pyrite is in metasedimentary rocks.	One small pit.	One sample: no gold or silver was detected (Lowe and others, 1983, appendix, no. 51).
215	Betty Ruth prospect (T14N, R11E, sec. 25) A. M. Helean	A shear zone containing malachite, pyrite, and arsenopyrite strikes northwest in granodiorite.	Two adits, 120- and 110-ft long, and three pits. The upper and lower workings are connected by a winze.	Nine samples were taken: a grab sample contained 0.204 oz/ton gold, 28.0 oz/ton silver, 0.05% copper, 6.60% lead, and 0.27% zinc; eight chip samples contained 0.006 to 0.164 oz/ton gold and 0.5 to 29.0 oz/ton silver. Five chip samples contained copper ranging from 0.01% to 0.05%, and five contained lead ranging from 0.22% to 3.65% and zinc ranging from 0.03% to 0.13% (Lowe and others, 1983, appendix, no. 47).
216	Wild Buck prospect (T14N, R11E, sec. 26) A.M. Helean; Ray G. Bohn	Shear zones strike northwest in granodiorite with biotite schist xenoliths.	One caved adit, estimated to be less than 40-ft long, and two trenches.	Four samples were taken: three grab samples averaged 0.059 oz/ton gold and 10.73 oz/ton silver; two averaged 0.83% and 0.03% lead and zinc, respectively; one contained 0.04% copper. A chip sample contained 0.038 oz/ton gold, 2.8 oz/ton silver, 0.06% lead, and 0.02% zinc (Lowe and others, 1983, appendix, no. 48).
217	Surprise prospect (T14N, R11E, sec. 25) A.M. Helean	A shear zone with pyrite is in granodiorite.	One 20-ft adit.	One sample contained 0.02% zinc; no gold, silver, or lead was detected (Lowe and others, 1983, appendix, no. 49).
218	Canary Yellow prospect (T14N, R11E, sec. 25)	A northwest-trending quartz-filled shear is in granodiorite. The rock is highly altered; some schistose rock is in the talus. Malachite was seen on the dump.	Two caved adits, estimated at >350 ft total length, and one small pit.	Three grab samples: <0.2, 48.2, and 61.0 oz/ton silver; 0.62% copper; 7.90% and 8.10% lead; 0.20% and 0.42% zinc (Lowe and others, 1983, appendix, no. 50).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
219	Bonanza prospect (T14N, R11E, sec. 35)	A 0.3-ft-thick, pyrite-bearing quartz vein strikes N42°W in granodiorite.	Two trenches and three small pits.	Two samples: grab sample contained 0.048 oz/ton gold, 0.7 oz/ton silver, 0.08% lead, and 0.01% zinc; chip sample contained 0.005 oz/ton gold and 0.2 oz/ton silver (Lowe and others, 1983, appendix, no. 58).
220	Long Shot prospect (T14N, R11E, sec. 35) A.M. Helean; Ray Bohn	Shear zones and quartz veins are in granodiorite which contains some metasedimentary xenoliths and diabase dikes. Malachite, pyrite, arsenopyrite, and galena are exposed in the workings. Shear zones strike west to northwest.	Two adits, 50 ft and 80 ft long, one caved adit, one trench, and three pits.	Eight samples were taken near the adits: seven contained from 0.018 to 0.756 oz/ton gold, averaging 0.201 oz/ton; silver ranged from 0.2 to 12.4 oz/ton. Three contained as much as 0.10% copper, from 0.17% to 7.9% lead, and from 0.01% to 0.13% zinc (Lowe and others, 1983, no. 57). Two chip samples were taken from the trench. The chip samples contained 0.118 and 0.134 oz/ton gold, 0.9 and 7.9 oz/ton silver, 0.17% and 7.70% lead, and 0.03% and 0.1% zinc; one sample contained 0.07% copper. One select sample taken from the pits contained 1.11 oz/ton gold and 1.0 oz/ton silver (Ridenour, 1985, p. 64-65).
221	Longshot No. 3 prospect (T14N, R11E, sec. 36) Ray Bohn	A northerly striking shear zone with pyrite and arsenopyrite hosted by granodiorite.	One trench.	One grab and one chip sample: 0.118 and 0.134 oz/ton gold, 0.9 and 7.9 oz/ton silver, 0.17% and 7.70% lead, and 0.03% and 0.12% zinc; the grab sample contained 0.07% copper (Lowe and others, 1983, appendix, no. 56).
222	Longshot No. 3 prospect (T14N, R11E, sec. 35) Ray Bohn	A quartz vein is in granodiorite.	Three pits.	One select grab sample: 1.11 oz/ton gold and 1.0 oz/ton silver (Lowe and others, 1983, appendix, no. 55).
223	MIA No. 30 prospect (T14N, R11E, sec. 35) Ray Bohn	A 0.5-ft-wide quartz vein in a northwest-striking shear occurs in granodiorite.	One small pit.	One select sample was taken: 0.568 oz/ton gold, 20.0 oz/ton silver, 0.22% lead, and less than 0.01% zinc (Lowe and others, 1983, appendix, no. 54).
224	Stella (Iron Blossom) prospect (T14N, R12E, sec. 29)	Iron-oxide-stained zones are in quartz monzonite. Locally disseminated pyrite and dump material at a pit indicates a shear zone that has extensive chloritic alteration.	Two sloughed shallow pits.	Two chip samples and three grab samples: no gold or silver was detected (Leszcykowski and others, 1983, appendix, no. 22).
225	Prospect (T14N, R12E, sec. 29)	Quartz veins are in a minor shear zone in quartz monzonite.	One adit about 15-ft long; the portal is partially collapsed.	One chip and one grab sample: no gold or silver was detected (Leszcykowski and others, 1983, appendix, no. 23).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
226	Prospect (T14N, R12E, sec. 28)	Metasedimentary rock xenoliths in quartz monzonite are pyritized and have numerous quartz-filled fractures.	Two small pits.	Two chip samples: no gold or silver was detected (Leszcykowski and others, 1983, appendix, no. 27).
227	Kidney Lake prospect (T14N, R12E, sec. 26)	Hematite-stained, siliceous, metasedimentary rock, probably schist, has less than 5% disseminated pyrite and pyrrhotite.	One bulldozer trench, one shallow pit.	Two grab samples: no gold or silver was detected (Leszcykowski and others, 1983, appendix, no. 10).
228	Last Dollar prospect (T14N, R12E, sec. 34)	A metasedimentary xenolith in quartz monzonite contains disseminated pyrite and numerous quartz-filled fracture zones.	Two adits: 50-ft and 20-ft long.	One chip sample: 0.5% lead and 0.07% lead and zinc (Ridenour, 1985, p. 76, no. 97).
229	Pinyon Silver prospect (T14N, R12E, sec. 33)	Xenoliths of argillite and schist containing disseminated pyrite and arsenopyrite occur in quartz monzonite. Xenoliths were fractured and sheared and contain up to 5% quartz.	Three adits and five pits. All adits are less than 30 ft long.	Ten chip samples: two samples had 0.01 and 0.018 oz/ton gold and three samples contained 3.4, 2.6, and 0.6 oz/ton silver. Less than 0.06% lead was detected and only one sample contained more than 0.08% zinc (0.44% zinc) (Ridenour, 1985, p. 76).
230	Williamson mine (T14N, R12E, sec. 32)	Silicified shear zones as much as 4-ft wide are in schist. Schist occurs as xenoliths in quartz monzonite.	One 133-ft-long adit, and two pits.	Five chip samples: gold content in one sample was 0.26 oz/ton, silver in two samples was 1.1 and 1.4 oz/ton, lead content of four samples was 0.10%, 0.18%, 0.19%, and 0.28% (Leszcykowski and others, 1983, appendix, no. 21).
231	Prospect (T14N, R12E, sec. 32)	A quartz-rich shear zone is in quartz monzonite. Pyrite, arsenopyrite, and galena are in quartz.	One pit.	Two samples: a chip sample contained 5.4 oz/ton silver and 0.82% lead; a grab sample contained 0.050 oz/ton gold, 8.0 oz/ton silver, and 1.44% lead; no other anomalous mineral content was detected (Leszcykowski and others, 1983, appendix, no. 20).
232	Prospect (T15N, R13E, sec. 31)	A 1- to 2-ft-thick fracture zone strikes N50°W and dips 75°SW in diorite and silicified schist. The heavily iron-oxide-stained fracture zones are cut by aplite dikes and can be traced discontinuously along the surface for about 130 ft. Vein material consists of massive chalcopyrite in a quartz matrix with sulfide boxworks.	Three adits totalling approximately 400 ft long; one caved adit, estimated at <25 ft long; one water-filled shaft, estimated at <20 ft deep; one small pit.	Seven chip samples and two grab samples: gold ranged to 0.21 oz/ton, silver ranged to 1.5 oz/ton, copper (in seven samples) ranged to 10.3%, and one sample contained 0.29% lead and 0.27% zinc (Ridenour and others, 1983, appendix, no. 16).
233	Prospect (T15N, R13E, sec. 31)	Pyrite and chalcopyrite fill fractures along the contact between an aplite dike and diorite.	One 12-ft adit.	One chip sample: no gold or silver was detected; 0.01% copper (Ridenour and others, 1983, appendix, no. 17).

Table A-1.--Mines and prospects in the Middle Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
234	Prospect (T15N, R13E, sec. 31)	Quartz-hematite veins fill fractures in dark gray siliceous limestone.	Two shallow pits.	Two chip samples, one grab sample: silver ranged from <0.2 to 0.5 oz/ton silver, no gold was detected (Ridenour and others, 1983, appendix, no. 18).
235	Whiskey group (T14N, R12E, sec. 1)	Quartz fills fractures that strike N30°W and dip 40°SW in siliceous, argillaceous limestone.	One 27-ft adit, one bulldozer trench, three shallow pits.	Five samples: three chip samples contained <0.005, 0.028, and 0.03 oz/ton gold and <0.2, 1.9, and 2.5 oz/ton silver; two grab samples contained 0.046 and 0.026 oz/ton gold, and 12.9 and 10.7 oz/ton silver (Ridenour and others, 1983, appendix, no. 74).
236	Prospect (T14N, R12E, sec. 11)	A quartz-filled fissure vein cuts quartz monzonite.	Two caved adits, estimated at <50 ft long, three shallow pits, one caved shaft, and one sloughed trench.	One grab sample: 0.01 oz/ton gold, 1.3 oz/ton silver, 0.38% lead, 0.39% zinc (Ridenour, 1985, p. 73, no. 75)

Table A-2.--Mines and prospects in the Challis Ranger District

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
237	Hot Creek lode occurrence (T15N, R15E, sec. 2)	Fluorite- and pyrite-bearing quartz veins occur in silicified tuffs along a 2.5-mi-long fault zone (Ridenour, 1985, p. 61).	No workings.	One sample contained 0.29 oz/ton gold, 160.7 oz/ton silver and 0.051% fluorite. (Ridenour, 1985, p. 61).
238	Geothermal occurrence (T15N, R15E, sec. 1)	Unknown (Ross, 1934, p 105); probably along fractures in volcanic rocks.	Undeveloped.	No data.
239	Lower Snowshoe Fluorspar occurrence (T15N, R16E, sec. 6)	Rhyolite-tuff and andesite contain massive quartz breccia and quartz veins with minor disseminated arsenopyrite and fluorite veinlets (Ridenour, 1985, p. 66, no. 6).	No workings.	One of four samples contained 39% fluorite; no other mineral commodities were detected.
240	Snowshoe Creek Fluorspar occurrence (T16N, R16E, sec. 32)	Fluorite-filled fractures are in tuff and andesite (Ridenour 1985, p. 66, no. 5).	No workings.	Two chip samples contained 21% and 23% fluorite and two grab samples had 0.27% and 47% fluorite.
241	Shower Bath geothermal occurrence (T15N, R16E, sec. 17)	Seven springs discharge a total of about 200 gallons of water per minute. The discharge is probably from fault zones in volcanic rocks. Temperatures of the water at two springs, measured in 1925, were 122.5° F and 120.6° F respectively Ross (1934, p. 106).	Undeveloped spring.	Analyses of water samples indicates that the hot-spring thermal gradient and geothermal potential are low.
242	Parker mine (T15N, R16E, sec. 27) J.H. Meyer and Alaska Pacific Incorporated	The Parker mine is located near the southern end of the Parker Mountain mineralized zone; the Williams mine is on the northern end. The zone is epithermal and is in faulted, brecciated- and silicified-tuff and -rhyolite. Along two fault zones at the Parker mine are gold- and silver-bearing veins and breccia. One fault zone strikes N10°W and dips 40°-60° NE; the other strikes N20°E and dips 70°-80°E. The veins and breccia are as thick as 8 ft and contain quartz, free gold and argentite. The explored part of Parker Mountain mineralized zone is 250 ft wide and 1,200 ft long (Ridenour, 1985, p. 48-56).	At the mine are 15 adits and more than 40 small pits, cuts and drill sites. Most of the adits are caved; they total at least 800 ft. Between 1980 and 1983, Denison Mines Incorporated and Houston International Minerals Corporation examined the mineralized zone; six holes were drilled each about 500 ft deep. Between 1905 and 1941, the mine produced 603 oz of gold and 3,744 oz of silver (Fisher and Johnson, 1987, p. 104). The ore was treated in a nearby mill by gravity and cyanide vat leach methods. The mill no longer exists. (Ridenour, 1985, p. 48).	A total of 36 samples were taken at the Parker mine during the USBM examination. Six of 24 underground samples contained more than 0.25 oz/ton gold and two had 3.75 and 6.11 oz/ton. Surface samples contained 0.017 oz/ton gold or less. The zone is extensively silicified and mineralized and may contain a low-grade disseminated silver/gold deposit (Ridenour, 1985, p. 48).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
243	Williams mine (T15N, R16E, sec. 26) J. H. Meyer and Alaska Pacific Incorporated	The Williams mine is on the northern end of the Parker Mountain mineralized zone. The epithermal zone, consisting of gold- and silver-bearing veins and breccia, is along faults in tuff and rhyolite. The entire zone is 250 ft wide and 3,000 ft long. The veins and breccia at the Williams mine trend northeast and contain free gold, electrum and argentite (Ridenour, 1985, p. 48).	The workings include two inaccessible adits that total about 550 ft and more than 50 small pits, cuts, trenches and drill sites. The area was explored between 1980 and 1983 (see Parker mine, no. 242 above). The ore from the Williams as well as the Parker mine was treated in a nearby mill by gravity and cyanide vat leach methods (Ridenour, 1985, p. 48-54). Between 1908 and 1941, 216 oz of gold and 776 oz of silver were produced from the Williams mine (Fisher and Johnson, 1987, p. 104).	Of 20 samples from surface workings, (Ridenour, 1985, p. 48) eight had detectable gold; two had more than 0.1 oz/ton. Twelve samples had detectable silver; five had more than 1 oz/ton. Although the veins and breccia bodies are small and only moderately mineralized, the zone is extensively silicified and may contain a low-grade disseminated silver/gold deposit.
244	Spider Creek prospect (T15N, R16E, sec. 13)	Vitrophyre is in volcanic rocks (Ridenour, 1985, p. 67, no. 9).	Four prospect pits.	One grab sample contained no gold or silver.
245	Last Chance prospect (T15N, R17E, sec. 19)	Pyrite nodules, up to 1.2 ft in diameter, are in a rhyolite flow (Ridenour, 1985, p. 67, no. 10).	No workings.	One chip sample contained no gold or silver.
246	West Creek prospect (T14N, R17E, sec. 35) Shama Minerals Company	A poorly-exposed shear zone strikes N40°-50°E and dips 30°NW in shale that trends northwest and dips 10°SW. Along the zone are breccia and quartz that contain galena and malachite. The quartz occurs as lenses that are as thick as 0.7 ft (USBM, 1988).	For about 500 ft along the trend of the shear zone are three prospect pits, an adit that is about 90 ft long and a bulldozer cut that is about 100 ft long.	Two 1988 USBM samples were taken across the mineralized shear: a 0.5-ft-long chip sample from the face of the adit on the south end of the zone contained 230 ppm lead, 67 ppm zinc, 84 ppm copper and 1.1 ppm silver, and a 0.7-ft-long sample from the bulldozer cut on the north end had 245 ppm lead, 105 ppm zinc, 418 ppm copper and 2.5 ppm silver.
247	Mary Alice prospect (Mill Creek prospect) (T14N, R18E, sec. 29) Shama Minerals Company	Poorly-exposed sulfide-bearing lenses are along a shear zone that strikes N65°W and dips 65°NE in dolomite near shale and quartzite beds that are nearly horizontal. The lenses are as thick as 3 ft, can be traced for as much as 80 ft and are composed of quartz with fluorite, galena and azurite. Surrounding the mineralized shear zone exposure on the north side of the creek is brecciated dolomite cemented by fluorite (USBM, 1988).	Workings are on both sides of Mill Creek. North of the creek is a bulldozer trench that is about 80 ft long; to the south are two prospect pits and an adit that is 15 ft long.	Two 1988 USBM samples were taken: a grab sample from the bulldozer trench contained 0.8 ppm silver, 8 ppm copper, 58 ppm lead and 210 ppm zinc; and a chip sample across a lens exposed in the adit contained 85 ppb gold, 152 ppm silver, 438 ppm copper, 11,900 ppm lead and 288 ppm zinc. The fluorite occurrence may be sizable and contain 20% to 30% CaF_2 (USBM, 1988).

Table A-2.--Mines and prospects in the Challis Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
248	New Hope prospect (T14N, R18E, sec. 32) G. E. Shoup	Quartz lenses with fluorspar are along limonitic shear zones transecting beds of dolomite and shale that are exposed below a limestone cliff. The beds strike N10°W and dip steeply west. The shear zones strike N45°W, dip northeast and are as thick as 10 ft. The mineralized structure is estimated to be at least 600 ft long, 4.0 ft wide and 250 ft deep.	Four adits and a shaft that total of less than 200 ft of workings are in a north- trending, 1,000-ft-long area.	Four 1988 USBM samples were taken: a 10-ft-long chip sample across a shear zone contained 728 ppm lead, 807 ppm zinc, 3 ppm silver and 47 ppm copper; an 8-ft-long chip sample of quartz contained 5.2 ppm silver and 135 ppm copper; a select sample from a small stockpile had 97,800 ppm lead, 8,936 ppm zinc, 482 ppm silver and 414 ppm copper; and a select sample from another small (2 tons), stockpile contained 284 ppm lead, 16,400 ppm zinc, 4 ppm silver and 188 ppm copper.
249	Florspar group (T13N, R18E, sec. 8) J. R. Simplot Company	Poorly-exposed fluorite lenses are along a zone of brecciation and shearing that follows the bedding in silicified dolomite near its contact with phyllite. The rocks are intensely-folded and -faulted. The exposure of the mineralized zone trends N20°W, dips steeply SW., is as wide as 30 ft and as long as 1,000 ft. The fluorite lenses along the zone are as thick as 16 ft (Kauffman, 1977).	In a north-trending, 1-mi- long, 1/2-mi-wide area straddling Daugherty Gulch are: four caved adits that are estimated to total at least 1,000 ft, large bulldozed pits over the tops of most of the adits, numerous smaller hand dug pits and trenches, drill sites and about 2 mi of unmaintained access roads. No production is recorded. The workings are covered by nine mining claims that were patented in 1962.	Kauffman (1977, p. 8), estimated that the zone contains at least 200,000 tons of resources averaging 30% CaF_2. Three 1988 USBM samples were taken to determine metal content. An 8-ft-long chip sample from the northern end of the zone contained 3.8 ppm silver, 24 ppm copper, 540 ppm lead and 230 ppm zinc. A grab sample from a dump near the middle of the zone contained 13.3 ppm silver, 145 ppm copper, 380 ppm lead and 490 ppm zinc. A 3-ft-long chip sample from the southern end of the zone had 2.3 ppm silver, 19 ppm copper, 220 ppm lead and 440 ppm zinc.
250	Challis View mine (Skyline #1) T13N, R18E, sec. 8 H. L. Smith	Poorly-exposed quartz lenses that contain galena and malachite are along shear zones in cliffs of cherty dolomite and limy-quartzite. The intensely-folded dolomite and quartzite beds trend northeast and dip steeply southeast. The principle quartz lens is along a shear zone that follows the crest of a small fold. This lens strikes N25°W, dips 45°NE, is as thick as 8 ft and can be traced 17 ft along strike (USBM, 1988).	Workings scattered for about 1,000 ft across the trend of the bedding include: a crosscut adit about 800 ft long, a caved shaft estimated to be less than 10 ft deep, a trench, and 50 ft of natural caves that have been partially stoped from the surface. Production includes 450 oz of silver, 118 lb of copper and 8,146 of lb lead (Fisher and Johnson, 1987, p. 101).	Five 1988 USBM samples were taken. A 3-ft-long chip sample across a shear zone near the face of the crosscut adit assayed 1.2 ppm silver, 11 ppm copper, 168 ppm lead and 445 ppm zinc. A 2-ft-long chip across a shear zone in the trench had 1.4 ppm silver, 8 ppm copper, 102 ppm lead and 215 ppm zinc. A grab sample of dump material from the shaft contained 0.8 ppm silver, 8 ppm copper, 82 ppm lead and 229 ppm zinc. A 3-ft-long chip sample across a lens in the principle open stope had 45 ppb gold, 437 ppm silver, 1,500 ppm copper, 86,600 ppm lead and 2,600 ppm zinc. A grab sample of lens material from a nearby stockpile contained 50 ppb gold, 790 ppm silver, 3,600 ppm copper, 93,500 ppm lead and 6,800 ppm zinc.

Table A-2.--Mines and prospects in the Challis Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
251	Kraken Hill (Chalspar) mine (T13N, R18E, sec. 4) Shama Minerals Company	The mine straddles the forest boundary. The deposits mined are within the forest although the mill and portal of a haulage adit are to the east. The deposits consist of lenses of fluorite along fracture and breccia zones that follow dolomite bedding. The beds trend north, dip west and are intensely folded and faulted into contact with volcanic rocks and slate. Three principle lenses, called the Past Up, West, and Cachalot veins, are developed. These veins strike within 30° of north, dip within 10° of vertical, are as thick as 10 ft, and are exposed for as much as 240 ft along strike (Anderson, 1954, p. 10).	In an area about 4,000 ft long (westerly) and 1,300 ft wide (northerly) are a 150-ton/day mill, a 1,600 ft-long haulage adit, a 65-ft-deep shaft, several short exploration shafts and adits, a number of drill sites, and hundreds of feet of bulldozer trenching. Two claims that were patented in 1962 cover part of the deposit that is in the Challis National Forest. About 475 tons of metallurgical grade fluorspar (88% CaF_2), and 245 tons of ore that required milling (55% CaF_2), were produced from the Chalspar mine in 1952 and 1953 (Shawe, 1976, p. 36).	In 1953, a part of the Past Up vein in the area of the shaft was estimated to contain 4,000 tons averaging 55% CaF_2 (Johnson and Nickelson, 1953, p. 2).
252	Skyline #8 mine (Daugherty group) (T13N, R18E, sec. 4) H. L. Smith	At the Skyline #8 mine, possibly the Dougherty group described by Umpleby, (1913a, p. 76), are lenses of quartz and fluorite that contain galena, sphalerite, tetrahedrite, pyrite, chalcopyrite, malachite and limonite. The poorly-exposed lenses are along shear zones that follow bedding and small folds in dolomite and slate. The shear zones examined generally strike N50°W, dip 30°SW and are as thick as 4 ft.	There are six adits on the north side of Garden Creek and two on the south side; in all perhaps 2,000 ft of workings (Umpleby, 1913a, p. 76). Most of the workings are caved. In 1917, 34 oz of silver and 854 lb of lead were produced (Fisher and Johnson, 1987, p. 99).	Eight 1988 USBM samples were taken. One 0.7-ft-long chip sample across a lens exposed in an adit contained 520 ppb gold, 200 ppm silver, 2,485 ppm copper, 42,400 ppm lead and 2,009 ppm zinc. A 2-ft-long chip sample across another lens exposed in an open stope had 40 ppm gold, 34 ppm silver, 462 ppm copper, 8,800 ppm lead and 4,000 ppm zinc. Six samples from stockpiles and dumps contained as much as 660 ppb gold, 422 ppm silver, 7,700 ppm copper, 106,000 ppm lead and 167,000 ppm zinc.
253	Bluebird prospect (T13N, R18E, sec. 9) Shama Minerals Company	A quartz lens at least 0.7 ft thick is along fractures in north-trending, east-dipping dolomite near a contact with siliceous metasedimentary rocks and granitic rocks. The lens contains galena and sphalerite. No in-place quartz is exposed.	An access road and a caved shaft at least 50 ft deep.	Two 1988 USBM samples of lens material were taken from the dump of the shaft. One sample contained 50 ppb gold, 213 ppm silver, 157 ppm copper, 77,100 ppm lead and 7,131 ppm zinc. The other contained 25 ppb gold, 84 ppm silver, 36 ppm copper, 20,700 ppm lead and 1,700 ppm zinc.
254	Troxpar prospect (T13N, R18E, sec. 9) Shama Minerals Company	Poorly-exposed lenses of fluorite and sulfide-bearing quartz are along shear zones near the crest of an anticline in north-trending, east-dipping beds of dolomite (Anderson, 1954, p. 12).	A small open pit and several shallow bulldozer trenches are in a 1/2-mi-long (westerly), 1/4-mi-wide (northerly) area. Some ore may have been produced, but none is recorded.	Two 1988 USBM samples of sulfide-bearing shear zone material were taken from dumps. These samples contained as much as 25 ppb gold, 13 ppm silver, 40 ppm copper, 954 ppm lead and 649 ppm zinc. Exposures are too poor to allow an estimate of either fluorite or metals resources.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
255	Aztec (Double Sneeze) prospect T13N, R18E, sec. 16 D. P. Wheeler	A poorly-exposed shear zone striking north and dipping 30°W transects black, pyritic, calcareous-shale striking N15°W and dipping 45°SW. The shear zone exposure is 6 ft thick and contains a quartz-galena pod that is 0.5 ft thick.	One 40-ft-long adit, and one 30-ft-long trench.	Five 1988 USBM samples were taken. A 6-ft-long chip sample across the shear zone exposure in the adit assayed 6.5 ppm silver, 36 ppm copper, 2,900 ppm lead and 3,100 ppm zinc. A 0.5-ft-long chip sample across the quartz-galena pod exposed in the adit contained 300 ppb gold, 431 ppm silver, 700 ppm copper, 300,000 ppm lead and 10,000 ppm zinc. A 0.3-ft-long chip sample across a nearby quartz vein had 0.1 ppm silver, 32 ppm copper, 24 ppm lead and 58 ppm zinc. Two grab samples of mineralized material from the adit dump (total about 120 tons), had as much as 15 ppb gold, 13.3 ppm silver, 52 ppm copper, 5,500 ppm lead and 143,000 ppm zinc.
256	Aztec #11 (Sneeze) prospect T13N, R18E, sec. 16 D. P. Wheeler	No mineralized structure is exposed. Alignment of workings and dump material suggest that quartz lenses follow a northwest-trending shear zone that transects black, pyritic shale for about 1,000 ft. Quartz on dumps and contains galena. Nearby is a contact with dolomitic metasedimentary rocks.	Three caved adits are estimated to total less than 300 ft.	Two 1988 USBM samples were taken. A grab sample from all of the adit dumps (they contain a total of about 200 tons of material) assayed 1.3 ppm silver, 30 ppm copper, 180 ppm lead and 430 ppm zinc. A grab sample of quartz had 295 ppb gold, 24 ppm silver, 870 ppm copper, 320 ppm lead and 10,000 ppm zinc.
257	JS prospect (T13N, R18E, sec. 16) Shama Minerals Company	A quartz lens, along a shear zone in calcareous-slate, strikes N2°W and dips 64°NE. The lens, containing limonite, sphalerite and galena, is exposed for 115 ft along strike and averages 1.1 ft thick.	One 115-ft-long adit follows the lens.	Four 0.8-ft to 1.8-ft-long chip samples were taken across the shear zone and lens (USBM, 1988). The samples contained between 0.4 ppm and 16 ppm silver, 22 ppm and 121 ppm copper, 68 ppm and 4,516 ppm lead and 314 ppm and 2,364 ppm zinc; one sample also had 35 ppb gold.

Table A-2.--Mines and prospects in the Challis Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
258	Keystone mine (T13N, R18E, sec. 22) A. E. Chambers and Inspiration Development Incorporated	Fluorite and quartz are in breccia zones in dolomite near its contact with overlying slate. The dolomite and slate beds are deformed into a broad, locally overturned anticline (Kauffman, 1976). Fluorite lenses can be traced for 6,000 ft along the contact (Anderson, 1954, p. 12). Smaller, metal-bearing quartz and barite lenses outside the fluorite zone, contain galena, tetrahedrite, quartz, and barite.	Workings include eight adits, four shafts, and numerous cuts, pits, and drillsites. Drilling was done as recently as 1988. The underground workings total more than 1,200 ft. The workings cover an area about 1 mi long (southwesterly) and 1/2 mi wide. The mine includes five claims that were patented in 1899. Recorded between 1882 and 1930 was the production of about 4,700 oz silver, 2,400 lb copper and 3,800 lb lead (Chambers, 1966, p. 107). No fluorspar production is recorded.	Kauffman (1976, p. 8) estimated inferred resources of about 260,000 tons averaging 48% fluorite. No metallic resources are apparent.
259	G. C. Silver prospect (T13N, R18E, sec. 21)	A poorly-exposed, quartz lens in cherty dolomite contains galena. The dolomite is jasperized along the lens margins.	Two south-trending adits about 30 ft apart total 145 ft.	One 1988 USBM sample from across the 1.5 ft-thick lens contained 10 ppm silver, 22 ppm copper, 4,516 ppm lead and 1,944 ppm zinc.
260	Benchmark prospect (T13N, R21E, sec. 27)	At least two poorly-exposed, limonite-bearing barite lenses are in horizontal beds of calcareous mudstone and limestone.	One small prospect pit and a 15-ft-long trench are about 1,000 ft apart.	A grab sample was taken from each working. The sample from the pit contained 0.5 ppm silver, 36 ppm copper, 210 ppm lead and 195 ppm zinc; the sample from a 1-ton stockpile at the trench contained 0.1 ppm silver, 19 ppm copper, 60 ppm lead and 26 ppm zinc (USBM, 1988).
261	Grouse Creek Lake prospect (T12N, R21E, sec. 3)	Zinc- and lead-bearing carbonate minerals are in vuggy, limonite-stained limestone.	One adit about 100 ft long is caved, one sloughed pit.	A grab sample from the pit contained 0.5 ppm silver, 35 ppm copper, 20 ppm lead and 490 ppm zinc. A grab sample from the dump of the adit contained 0.6 ppm silver, 12 ppm copper, 48 ppm lead and 255 ppm zinc (USBM, 1988).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
262	Mahogany Hill prospect (T13N, R22E, sec. 31)	A shear zone, striking N10°E and dipping 30°SE, follows the crest of a small fold in shale near its contact with limestone. Along the shear zone are breccia, limonite and smithsonite.	For about 250 ft along the shear zone are two prospect pits, a caved adit estimated to be about 50 ft long and an open adit that is 34 ft long.	A grab sample of dump material from the caved adit assayed 0.4 ppm silver, 32 ppm copper, 20 ppm lead and 1,200 ppm zinc; a 3-ft-long chip sample across the shear zone exposure in the open adit contained 0.8 ppm silver, 170 ppm copper, 22 ppm lead and 2,100 ppm zinc (USBM, 1988).
263	Hilltop occurrence (T10N, R22E, sec. 12)	A quartz breccia zone in limestone contains sparse replacements of galena and barite (Walker, 1957) The zone strikes N70°W, dips 30°NE and is 20 ft thick.	No workings.	One select sample contained 44.0% lead, 0.6 oz/ton silver, and 0.02 oz/ton gold (Walker, 1957).
264	Big Dike prospect (T10N, R22E, sec. 12)	A 10-ft-thick vein of calcite at least 30 ft long, strikes N15°W and dips 67°NE in limestone. Possible vein extensions are covered by talus. The prospect was probably located for optical calcite (Capstick and others, 1987, table 1).	One prospect pit.	One select sample contained no significant concentrations of economic minerals.
265	H&R (Rocky Mountain Goat) mine T17N, R22E, sec. 20	No mineralized structure is exposed. Material on dumps indicate narrow veins are near the contact between a basaltic dike and quartzite. Vein material on dumps is mainly quartz with chalcopyrite, malachite, and chrysocolla (Cather and Rains, 1988, p. 42, no. 2).	There are six caved adits and an open cut. About 15 tons of ore were reportedly produced in 1890 (USBM, 1988). The amounts of gold and copper recovered is unknown.	Two samples of vein quartz contained 1.8% and 7.8% copper; each also had 0.1 oz/ton silver; a grab sample from a small stockpile contained 0.11% thorium (Cather and Rains, 1988).
266	Prospect (T15N, R23E, sec. 9)	Fracture zones in quartzite contain quartz and specularite (Cather and Rains, 1988, p. 43, no. 7).	A trench and a prospect pit.	Two samples had no significant metals concentrations.
267	Miller mine (General Electric-Miller mine) T14N, R23E, sec. 10 Roger Pierce Estate	The mine is on a surface extension of the Ima mine mineralized zone. At the Miller mine, the zone consists of metals-bearing veins along quartzite bedding that strikes N30°-40°W and dips 20°-30°SW (Callaghan and Lemmon, 1941, p. 19). The veins are at least 2 ft thick and composed of pyrite and huebnerite with scheelite, tetrahedrite, galena, sphalerite and chalcopyrite in lenses of quartz, fluorite, calcite, orthoclase and rhodochrosite.	In an area about 4,000 ft long (northerly), and 2,000 ft wide are numerous trenches, drillsites, and access roads and 12 underground workings; the largest is the 1,600 ft-long GE Crosscut. Forty tons of material were mined in the 1940's for testing.	Ore tested ranged form 0.6% to 1.05% WO_3 (Lorain, 1941, p. 3).

Table A-2.--Mines and prospects in the Challis Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
268	Ima mine (T14N, R23E, sec. 23) Bradley Mining Company	The mine straddles the forest boundary; the deposit, mining claims and workings extend into the forest. The deposit at the Ima mine is porphyry-type and is hosted by quartzite and an intruding granitic stock. The deposit contains two distinct mineralized zones; an inner in the granitic stock and an outer zone in the intruded quartzite (Joralemon, 1973). All ore so far produced came from the outer zone. The inner zone is below the mine workings and is explored mainly by drilling. In the sericitized and silicified granitic rock of the inner zone are molybdenite-, huebnerite-, chalcopyrite- and pyrite-bearing disseminations and quartz-calcite veinlets. The inner zone trends northwesterly, and is as wide as 800 ft wide and as long as 2,300 ft. The outer mineralized zone, in the intruded quartzite, consists of pyrite, huebnerite, scheelite, tetrahedrite, galena, sphalerite and chalcopyrite in veins of quartz, fluorite, calcite, orthoclase and rhodochrosite. The outer zone trends northwest, is as wide as 900 ft, as long as 2,000 ft-long and as deep as 700 ft.	Workings extend over a 2 mi^2 area along Patterson Creek. Three major adits with a number of sublevels total more than 3 mi of underground workings. As much as 3 mi of diamond drilling has been done; some as recently as 1988. A gravity mill, now dismantled, and extensive tailings, are near the portal of the haulage level in the canyon bottom outside the forest. The mine is covered by 21 mining claims that were patented in 1962. Some ore is reported to have been produced between 1913 and 1928; the amount is unknown. Between 1934 and 1958, about 756,000 tons of tungsten ore were produced that averaged 0.55% WO_3 (Bradshaw, 1980, p. 2). Between 1937 and 1944 8,608 tons of sulfide concen-trates were produced that averaged 42 oz/ ton silver, 0.01 oz/ton gold, 3.75% copper, 7% lead, 5% zinc, and 0.5% tungsten (Parsons and Alvord, 1959, p. 5.	Analyses of sample from the inner zone, most of which is in the forest, suggest a grade of 0.14 oz/ton silver, 0.05% copper, 0.1% to 0.3% molybdenum and 0.03% WO_3 (Joralemon, 1973). Data are too limited to allow an estimate of the size of the inner zone resource. When the mine closed in 1958, identified resources in the outer zone totalled about 350,000 tons averaging 1.9 oz/ton silver, 0.19% copper, 0.22% lead, 0.2% zinc and 0.5% WO_3 (Joralemon, 1973, p. A). Additional outer zone resources are likely. Tailings located outside the forest also contain tungsten.
269	Silver group (T14N, R24E, sec. 7) W.D. Mines	No mineralized structure is exposed. Quartz, in float and on workings dumps, indicates a series of veins. The quartz, in fragments as thick as 0.5 ft, contains chalcopyrite, tetrahedrite, galena, and malachite. Country rock is siltite and quartzite.	Workings consist of three prospect pits and a caved adit that is estimated to be 250 ft long.	Three select samples contained as much as trace gold, 21.00 oz/ton silver, 2.02% lead and 1.4% copper (USMB, 1988).
270	Prospect (T14N, R24E, sec. 18)	The prospect is probably on an extension of the Ima mine mineralized structure; a zone of base metals-bearing veins and shear zones. Ruppel (1980), shows the area to be underlain by glacial moraines and siltite.	Two prospect pits (Ruppel, 1980).	No data.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
271	Prospect (T14N, R24E, sec. 16)	No mineralized structure is exposed. Dump material indicates a quartz vein at least 0.1 ft thick, containing siderite, specularite and malachite, is in quartzite (Cather and Rains, 1988, p. 44, no. 12).	One prospect pit.	A select sample of vein material contained trace amounts of copper and antimony.
272	Yellow Peak prospect (T14N, R25E, sec. 17)	Small veins are in quartzite that is intruded by a granitic stock. The veins are composed of vuggy, limonite-stained quartz (Cather and Rains, 1988, page 44, no. 13).	Two prospect pits.	A sample of vein fragments 3,000 ft from the granitic stock had no significant mineral values. A 0.3-ft-long chip sample across a vein near the stock contact contained 0.5 oz/ton silver.
273	Big Creek & Wells Cobalt prospects (T13N, R24E, sec. 22)	Poorly-exposed fractures in quartzite and siltite contain quartz, calcite, malachite, limonite and pyrite. The principle mineralized structure, a 1.5-ft-thick shear zone striking N35°W and dipping 65°SW, also contains the cobalt-bearing mineral erythrite and a cobalt-nickel-bearing mineral of the skutterudite series (Cather and Rains, 1988, p. 45, nos. 15 and 16).	Two adits 140 ft and 20 ft long, two pits, and an open cut.	Six 1988 USBM samples contained as much as 1.3% copper and 0.2 oz/ton silver. One sample taken during a previous study contained 0.32 oz/ton gold, 1.90 oz/ton silver, 0.47% cobalt, and 0.19% nickel (Buel, 1952).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
274	Zeolite occurrence (T15N, R17E, sec. 31)	Zeolite-bearing tuffs are exposed for 3,000 ft along a ridge and for 600 ft vertically. The Twin Peaks caldera has a zeolite-bearing cooling unit along the structurally intact southeastern part of the caldera. Zeolitically altered rocks are pale green to buff in color.	None.	Two 300-ft-long chip samples contained 40% and 30% clinoptilolite and 20% mordenite. Several billion tons of zeolite-bearing rocks of unknown grade are estimated (Ridenour, 1985, p. 67, no. 11).
275	Tip group (T14N, R16E, sec. 2)	Rhyolite porphyry contains disseminated pyrite and arsenopyrite.	One sloughed trench.	One grab sample: 0.2 oz/ton silver; no gold was detected (Ridenour, 1985, p. 67, no. 13).
276	Zeolite occurrence (T14N, R16E, sec. 30)	Zeolite minerals occur in the Twin Peaks caldera in a zone over 0.75 mi wide, 8 mi long, and more than 1,500 ft thick. Zeolitically altered rocks have been altered to pale green and buff colors. Mordenite and clinoptilolite have been identified.	None.	One sample: 55% clinoptilolite. Several billion tons of zeolite-bearing rock of unknown grade is estimated (Ridenour, 1985, p. 67, no. 14).
277	Zeolite occurrence (T14N, R15E, sec. 12)	Zeolite minerals occur in the Twin Peaks caldera in a zone over 0.75 mi wide, 8 mi long, and more than 1,500 ft thick. The zeolitically altered rocks are altered to pale green and buff colors. Mordenite and clinoptilolite have been identified.	None.	Several billion tons of zeolite-bearing rock of unknown grade are estimated (Ridenour, 1985, p. 67, no. 15).
278	Zeolite occurrence (T14N, R15E, sec. 11)	Zeolite minerals occur in the Twin Peaks caldera in a zone over 0.75 mi wide, 8 mi long, and more than 1,500 ft thick. Zeolitically altered rocks are bleached to pale green and buff colors. Mordenite and clinoptilolite have been identified.	None.	Several billion tons of zeolite-bearing rock of unknown grade is estimated (Ridenour, 1985, p. 67, no. 16).
279	Massacre Mercury prospect (T15N, R15E, sec. 8)	Prospects at river level are in heavily altered andesite and the prospects on the ridge crest are in phyllite in the altered andesite country rock. Andesite contains discrete grains and small blebs of disseminated pyrite and arsenopyrite. The upper workings are on a narrow shear zone that strikes N55°E and dips 85°SE.	Two caved adits, probably less than 50-ft long, a 15-ft long adit and three sloughed cuts.	One chip and one grab sample: no mercury was observed. Four samples taken by the USBM (1943) contained no more than 0.4 lb/ton mercury (Ridenour, 1985, p. 66, no. 8).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
280	Loon Creek Hot Springs (T15N, R15E, sec. 8)	A group of nine hot springs on Loon Creek, near the mouth of Warm Springs Creek, discharges 700 gallons of hot water per minute. This low temperature geothermal system is probably controlled by a fault in the basement rocks. Water emerges from alluvium near creek level.	Unknown.	A water sample collected in 1925 by C. P. Ross contained 60 ppm SiO_2, 4 ppm Ca, 75 ppm Na + K, 23 ppm CO_3, 55ppm HCO_3, 49 ppm SO_4, 14 ppm Cl, and 0.06 ppm Fe. Total dissolved solids was 278 ppm (Ross, 1934, p. 105-106).
281	Lucky Star prospect (T14N, R14E, sec. 13)	Monzonite has numerous fractures and shear zones that strike N30°-45°W and dip 75°-90°SW The shear zones are 1- to 2-ft wide and contain minor amounts of pyrite, chalcopyrite, and arsenopyrite. Iron-oxide-stained, silicified fault zones have sulfide minerals and malachite.	Two adits, 140 ft and 60 ft long, and a caved adit estimated to be about 200 ft long.	Five chip samples and one select sample of quartz: the chip samples contained less than 4.2 ppm silver and one sample contained 0.32% copper. The select sample contained 0.146 oz/ton gold, 5.8 oz/ton silver, and 0.22% copper (Ridenour, 1985, p. 69, no. 34).
282	Billy Goat (Ridge Runner) prospect (T14N, R14E, sec. 24)	Quartz monzonite of the Idaho batholith contains multiple shear zones with quartz veins up to 2 ft thick. Structures strike N43°-59°W and dip 47°-72°SW. Iron-oxide-stained, silicified fault zones with sulfide minerals and malachite.	Three adits 120, 47, and 18 ft long.	Ten chip and three grab samples of quartz vein material: two of three grab samples contained 1.87 and 0.092 oz/ton gold and one sample contained 4.7 oz/ton silver. The three grab samples contained 4.7 oz/ton silver, and 0.41%, 0.13%, and 0.08% copper. Only two of the ten chip samples contained 0.11 and 1.36 oz/ton gold and 0.4 and 0.3 oz/ton silver. Copper content ranged from none detected to 0.13% in eight samples (Ridenour, 1985, p. 69, no. 33).
283	Prospect (T14N, R14E, sec. 25)	Schist, gneiss, and quartzite are intruded by rhyolite and andesite dikes. A strongly silicified shear zone strikes N80°W and dips steeply to the north.	Two small cuts totaling 5 ft long.	Two chip samples of gneiss: no gold or silver was detected (Ridenour, 1985, p. 68, no. 32).
284	Blue Lady prospect (T14N, R14E, sec. 25)	Quartz monzonite contains minor quartz-filled fissures and numerous metasedimentary xenoliths with malachite and azurite halos. A fissure vein exposed at the adit portal is 2.8 ft thick and has malachite, azurite, chalcopyrite, bornite, pyrite, and arsenopyrite. The vein strikes N42°E and dips 62°NW.	One adit about 10 ft long.	Two chip samples: 0.1 and 0.2 oz/ton silver, 0.96% copper; no gold was detected (Ridenour, 1985, p. 68, no. 31).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
285	Shell Creek Bar placer (T15N, R14E, sec. 26)	A placer deposit of probable Pleistocene age occurs at a bar near the mouth of Shell Creek (Ross, 1941a, p. 43). The estimated 8-ft thick deposit is poorly-sorted, very loosely-cemented coarse sand to cobble with less than 10% boulders and almost no clay. Fine- to very, very-fine sized gold is uniformly distributed throughout the deposit.	Two trenches were dug.	The Shell Creek bar deposit has an estimated 24,000 yd^3 of gravel with 0.0032 oz/yd^3 gold (Ridenour, 1985, p. 175).
286	Double Bar placer (T15N, R14E, sec. 27)	A placer deposit of probable Pleistocene age occurs along the middle reaches of Loon Creek. The estimated 8-ft thick bar is poorly-sorted, loosely-cemented material composed mainly of coarse sand to cobble size material. Fine gold is uniformly distributed throughout the deposit. Gold is concentrated at the alluvium-bedrock interface but the quantity is highly variable.	Four trenches were dug.	The deposit has a marginally economic, inferred gold resource with an estimated 18,000 yd^3 of gravel containing 0.0243 oz/yd^3 gold (assessment assumes this deposit would be mined in conjunction with the Tincup bar and West Tincup bar deposits) (Ridenour, 1985, p. 175).
287	East Transfer Bar placer (T15N, R14E, sec. 34)	A placer deposit of probable Pleistocene age, is estimated to be 4-ft thick. The gravel is poorly sorted, loosely cemented material composed mainly of coarse sand to cobble size. Fine gold is uniformly distributed throughout the deposit. Gold is concentrated at the alluvium-bedrock interface.	Two sample trenches were dug.	The bar has an estimated 3,800 yd^3 of gravel with 0.0049 oz/yd^3 gold (Ridenour, 1985, p. 175).
288	West Transfer Bar placer (T15N, R14E, sec. 27)	The deposit is of probable Pleistocene age below West Tincup campground. The estimated 7-ft thick bar is poorly-sorted, loosely-cemented material composed mainly of coarse sand to cobble size. Fine gold is uniformly distributed throughout the deposit. Gold is concentrated at the alluvium-bedrock interface.	One trench was dug.	The occurrence contains 16,000 yd^3 of gravel with 0.0042 oz/yd^3 gold (Ridenour, 1985, p. 175).
289	Tincup Bar placer (T15N, R14E, sec. 34)	The deposit is estimated to be 6-ft thick and composed of poorly-sorted, loosely-cemented, coarse-sand to cobble-sized material.	Four trenches were dug.	The deposit has inferred, marginally economic resources amounting to 26,000 yd^3 of gravel containing 0.0192 oz/yd^3 gold (assessment assumes this deposits would be mined in conjunction with the Double bar and West Tincup bar deposits) (Ridenour, 1985, p. 175).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
290	West Tincup Bar placer (T15N, R13E, sec. 36)	The deposit (estimated to be 7-ft thick) is of probable Pleistocene age on the northwest side of Loon Creek in elevated terraces above the present channel.	One trench was dug.	The bar has an estimated marginally economic, inferred resource of 33,000 yd^3 containing 0.0171 oz/yd^3 gold (assessment assumes this deposit would be mined in conjunction with the Double bar and Tincup bar deposits) (Ridenour, 1985, p. 175).
291	Airport disseminated copper (T15N, R13E, sec. 36)	Fractured, weathered and weakly-foliated quartz monzonite has fine-grained pyrite and chalcopyrite along joints and fractures as well as disseminated in the rock.	None.	One chip sample: 90 ppm copper. Yinger (1976, p. 102) shows nineteen samples ranging from 40 to 170 ppm copper and averaging 63 ppm.
292	Airport Bar placer (T15N, R13E, sec. 36)	A gravel bar (estimated 21-ft thick) with gravel of probable Pleistocene age occurs along Loon Creek.	One trench was dug.	The occurrence contains 531,000 yd^3 of gravel with 0.0030 oz/ton gold (Ridenour, 1985, p. 175).
293	Loon Creek placers (T14N, R13E, sec. 1) Kenneth Belknap	Loon Creek placers includes Grouse Creek, Oro Grande, and Casto bars which range in thickness from 14-to-29-ft thick.	Water diversion ditches and the remnants of a flume, which supported hydraulic and other placer operations during the 1920's, remain along 2 mi of Loon Creek near the old Casto townsite (Ridenour, 1985, p. 174). These gravels were heavily worked in early placer days. Production is variously estimated between $500,000 to $2 million (Umpleby, 1913c, p. 91).	Casto bar was classified as an inferred, subeconomic resource with 150,000 yd^3 of gravel, averaging 0.0087 oz/yd^3 gold. Gold occurrences at Grouse Creek and Oro Grande Creek had 369,000 yd^3 and 442,000 yd^3 of gravel with 0.0001 and 0.0025 oz/yd^3 gold, respectively (Ridenour, 1985, p. 175, 188).
294	Prospect (T14N, R13E, sec. 1)	Quartz-filled fissures are in quartz monzonite. Quartz is stained by iron oxide.	Two small sloughed pits.	Two grab samples: one sample contained 0.008 oz/ton gold (Ridenour, 1985, p. 70, no. 43).
295	Prospect (T15N, R13E, sec. 36)	Hematite-stained shear zone is in altered metasedimentary rock overlain by terrace gravels.	One partially caved adit, estimated at less than 20-ft long.	One chip sample: no gold or silver was detected (Ridenour, 1985, p. 70, no. 45).
296	Prospect (T15N, R13E, sec. 35)	A hematite-stained shear zone is in altered metasedimentary rock.	One caved adit, estimated at <15 ft long.	One chip sample: no gold or silver was detected (Ridenour, 1985, p. 70, no. 52).
297	Prospect (T14N, R13E, sec. 2)	Quartz-feldspar pegmatite dike cuts weakly foliated quartz monzonite.	Shallow pit.	One grab sample: no gold or silver was detected (Ridenour, 1985, p. 70, no. 50).
298	New York mine (T14N, R13E, sec. 3) Joseph Hughes; H&H Mining Co.	A dacite porphyry dike is in granitic gneiss. A quartz vein and silicified shear zone contain some pyrite and malachite.	One 80-ft adit, one 20-ft adit, one surface cut, possibly a short, caved adit.	Eight samples: seven chip samples contained trace to 0.05 oz/ton gold, a trace to 0.01 oz/ton silver, and 5.5% to 26.8% copper; one grab sample contained 0.83 oz/ton gold, 0.21 oz/ton silver, and 0.2% copper (Ridenour, 1985, p. 70, no. 51).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
299	Prospect (T15N, R13E, sec. 34)	A hematite- and manganese-oxide-stained quartz vein is in weakly-foliated quartz monzonite intruded by an andesite dike.	One caved adit, estimated at <50 ft long.	One grab sample; no gold or silver was detected (Ridenour, 1985, p. 71, no. 54).
300	Prospect (T15N, R13E, sec. 27)	A hematite-stained quartz vein and veinlets cut weakly-foliated quartz monzonite. Structures could not be traced beyond the proximate vicinity of the workings.	Two shallow pits.	One grab sample: 0.176 oz/ton gold and 0.7 oz/ton silver (Ridenour, 1985, p. 70, no. 53).
301	Prospect (T15N, R13E, sec. 26)	Weakly foliated and propylitized quartz monzonite country rock hosts a quartz-muscovite, north-trending fissure vein. The country rock was intruded by diorite, dacite, andesite, rhyolite porphyry, aplite, and granophyre dikes. A quartz vein about 2.5 ft thick contains limonite pseudomorphs after pyrite but no visible sulfides.	Two caved adits, estimated at 200 ft total length, possible sloughed short adit, two shallow pits.	Two grab samples: one contained 0.03 oz/ton gold and 0.5 oz/ton silver; the other contained 0.2 oz/ton silver but no gold was detected (Ridenour, 1985, p. 71, no. 58).
302	Prospect (T15N, R13E, sec. 27)	A coarse-grained, weakly-foliated quartz monzonite is intruded by a diorite dike. A quartz-monzonite-hosted quartz vein in an adit is 3 ft thick and trends north and dips 70°W.	Two adits totalling <50 ft long, one caved adit estimated at >100 ft long, and three shallow pits.	Three samples; one grab sample contained 0.3 oz/ton silver; no gold or silver was detected in the others (Ridenour, 1985,p. 71, no. 55).
303	Prospect (T15N, R13E, sec. 27)	Quartz veins are in gneiss and biotite schist.	Four shallow pits.	One grab and one chip sample: each had 0.2 oz/ton silver: no gold was detected (Ridenour, 1985, p. 71, no. 59).
304	Effa mine (T15N, R13E, sec. 28) Jim Ivers	The lower adit is driven along the contact between a granophyre dike and silicified schist. A shear zone contains quartz pods and lenses with as much as 15% sulfide minerals, dominantly pyrite with some chalcopyrite and arsenopyrite. The upper adit is driven in dacite porphyry apparently to intersect sulfide-bearing zones exposed in shallow pits above.	Two adits totalling more than 200-ft long and several small pits.	Three chip samples from the lower adit: two contained <0.005 and 0.226 oz/ton gold, <0.02 and 4.8 oz/ton silver and 0.01% to 0.04% copper. Four samples at the upper workings contained no gold or silver, two grab samples and one chip sample contained from 0.05% to 0.46% copper, one grab sample contained 0.188 oz/ton gold and 1.8 oz/ton silver (Ridenour, 1985, appendix, no. 14).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
305	Lost Packer mine (T15N, R13E, sec. 28) Jim Ivers III	The Lost Packer vein, explored over a vertical distance of about 1,000 ft and horizontal distance of about 2,000 ft, is enclosed in a fissure that strikes N5°E, and dips 75°NW, and is hosted by a Precambrian quartz-biotite schist broadly gradational with quartzite and micaceous quartzite. The vein ranges from less than 1-in. to as much as 5-ft wide, but averages about 20 in. Both walls of the vein are well defined and often marked by gouge. The fissure cuts granite as well as schist and post-dates dikes identified as lamprophyre. The quartz vein is cut by dacite porphyry and granophyre dikes. Post mineral faulting caused minor offsets of the vein. The ore is essentially composed of auriferous chalcopyrite with some inclusions of pyrite and pyrrhotite. The gangue is mostly quartz, siderite, and host rock fragments in varying proportions. Most of the gold is reportedly in quartz and chalcopyrite, with only a small amount in the siderite (Ridenour, 1985, p. 45).	Development includes about 12,750 ft of lateral underground workings on 10 levels. Recorded production from the mine is 9,874 tons of ore with an average grade of 2.0 oz/ton gold, 4.9 oz/ton silver, and 182 lb/ton copper. Much of this ore, hand sorted for transportation to a smelter, was taken from high-grade shoots (Ridenour, 1985, p. 45). The mine was producing ore in 1988.	In 1979, a core drilling program on the No. 7 level, resulted in the discovery of a faulted portion of the Lost Packer vein. Tenor of the ore in this vein is similar to previously produced ore. Seven samples of core contained from 0.32 to 3.05 oz/ton gold, 0.5 to 13.3 oz/ton silver, 2.77% to 28.5% copper, 0.08% to 0.32% lead, and one sample had 0.84% zinc (Ridenour, 1985, p. 47).
306	Prospect (T15N, R13E, sec. 27)	A moderately hematite-stained quartz vein with a trace of fine-grained pyrite boxwork, hosted by weakly-foliated quartz monzonite, is intruded by dacite and andesite dikes. The quartz vein is 2-ft wide, trends N60°E, and dips 85°SE.	Two caved adits, one estimated at <100 ft long, nine shallow pits.	Six grab samples: no gold or silver was detected (Ridenour, 1985, p. 71, no. 57).
307	Prospect (T15N, R13E, sec. 34)	A quartz vein 1.4-ft wide is hosted by weakly foliated quartz monzonite. The vein trends N5°W and dips 80°SW and has light-to-moderate, iron-oxide staining.	Three caved adits, totalling an estimated 200 ft long, and two shallow pits.	One chip sample, one grab sample: no gold or silver was detected (Ridenour, 1985, p. 56).
308	Prospect (T15N, R13E, sec. 33)	A quartz fissure vein is in schist; as much as 10% pyrite is in some quartz fragments.	One caved adit, estimated at <100 ft long.	One grab sample: 0.2 oz/ton silver and no gold was detected (Ridenour, 1985, p. 72, no. 63).
309	Prospect (T15N, R13E, sec. 33)	A quartz fissure vein is in schist.	One caved adit, estimated 400-ft long.	One grab sample: no gold or silver detected (Ridenour, 1985, p. 72, no. 62).
310	Prospect (T15N, R13E, sec. 32)	A quartz fissure vein in silicified schist is intruded by dacite porphyry.	One caved adit, estimated <50 ft long, one 5-ft adit, and three shallow pits.	Two grab samples: 0.2 oz/ton silver; no gold was detected (Ridenour, 1985, p. 73, no. 70).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
311	Prospect (T14N, R13E, sec. 3)	Silicified-to-dolomitic limestone is near a contact with an intermediate dike.	Two caved adits, one estimated at <100 ft and two shallow pits. This property may have produced flux for the smelter at the Lost Packer Mine (Ross, 1934, p. 123-124).	Two grab samples: no gold or silver was detected (Ridenour, 1985, p. 72, no. 64).
312	Prospect (T14N, R13E, sec. 3)	Disseminated, fine-grained pyrite, mostly altered to limonite, is in quartzite.	Three shallow pits. This property may have produced a limited amount of flux for the smelter at the Lost Packer Mine (Ross, 1934, p. 123-124).	Two grab samples: one contained 0.006 oz/ton gold; no silver was detected (Ridenour, 1985, p. 72, table 2, no. 65).
313	Sunrise (Metcalf) claim (T14N, R13E, sec. 4)	A quartz monzonite-dolomitic limestone contact zone strikes N8°E and dips 75°NW.	Three adits totalling 100 ft, one shallow shaft and 12 pits.	Seven chip samples: no gold or silver was detected (Ridenour, 1985, p. 68).
314	Sunrise Group and Lost Eagle shaft (T14N, R13E, sec. 5) Dwaine Nef	Precambrian quartz-biotite schist displays local sericitic alteration. A fissure vein, with associated shear zones contains quartz, siderite with minor pyrite, chalcopyrite, and galena. The fissure vein strikes N5°W and dips 85°SW and the zone is 6- to 15-ft thick.	Six pits, a collapsed adit of unknown length, a shaft reported to be 50-ft deep (Umpleby, 1913c) and several bulldozer cuts. US Bureau of Mines productions records show a small amount of lead, silver, and gold production.	Eight chip samples: no gold was detected; two samples contained 5.6 and 0.2 oz/ton silver (Ridenour, 1985, p. 73, no. 69).
315	Blue Bird prospect (T14N, R13E, sec. 9)	The prospect is at a contact between silicified schist (base of a pendant?) and a diorite intrusive body.	One 140-ft long adit, three shallow surface pits.	Six chip samples: no gold or silver was detected; minor amounts of arsenic, cobalt, fluorite, molybdenum, tungsten, copper, and zinc are present (Ridenour, 1985, p. 72, no. 67).
316	Prospect (T14N, R13E, sec. 10)	Dark-gray silicified limestone was intruded by diorite.	One caved adit, estimated at less than 100-ft long. This property probably provided flux to the Lost Packer smelter (Ross, 1934, p. 123-124).	Two grab samples of limestone: trace and 0.026 oz/ton gold, one had 0.5 oz/ton silver; one sample had 0.099% copper, 0.027% lead, and 0.056% zinc (Ridenour, 1985, p. 72, table 2, no. 66).
317	Prospect (T14N, R13E, sec. 3)	Lightly iron-oxide-stained quartz veinlets cut dacite porphyry.	One bulldozer trench, one shallow pit.	One grab sample: no gold or silver was detected (Ridenour, 1985, p. 70, no. 49).
318	Lucky Day (T14N, R13E, sec. 2) First Eagle Corp.; BYU	Quartz veins in muscovite schist intruded by dacite and granophyre dikes.	Two caved adits, estimated to total <100 ft long, four shallow pits.	Three samples: no gold detected in two grab samples and one chip samples, one grab sample contained 0.4 oz/ton silver (Ridenour, 1985, p. 70, no. 48).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
319	Prospect (T14N, R13E, sec. 2)	A weakly foliated quartz monzonite is intruded by a dacite porphyry dike. A 3-in. wide quartz vein striking N80°E, and dipping 45°SE separates the two rock types near the portal of the main adit. Both structures contain some pyrite and malachite.	One 80-ft adit, one 20-ft adit, one shallow surface pit which could be a short, caved adit.	Eight samples of quartz vein: seven chip samples contained a trace to 0.05 oz/ton gold, a trace to 0.01 oz/ton silver, and 5.5% to 26.8% copper; one grab sample contained 0.83 oz/ton gold, 0.21 oz/ton silver, and 0.2% copper (Ridenour, 1985, p. 70, no. 51).
320	Prospect (T14N, R13E, sec. 11)	Lightly to moderately, iron-stained quartz vein in chlorite-muscovite schist.	Four shallow pits.	Four samples: no gold or silver was detected in three grab samples and one chip sample (Ridenour, 1985, p. 70, no. 46).
321	Prospect (T14N, R13E, sec. 11)	An iron-oxide-stained quartz vein with some malachite is hosted by muscovite schist.	Three caved adits, totalling about 150 to 200 ft long, two shallow pits.	Three grab samples: one contained 0.062 oz/ton gold; no silver was detected (Ridenour, 1985, p. 69, no. 42).
322	Prospect (T14N, R13E, sec. 11)	Metasedimentary rock is intruded by an intermediate dike.	One shallow pit.	One grab sample of metasediments: a trace of gold and no silver was detected (Ridenour, 1985, p. 69, no. 40).
323	Prospect (T14N, R13E, sec. 11)	A quartz vein containing a trace of pyrite and malachite is hosted by biotite schist.	One shallow pit.	One grab sample: no gold or silver was detected (Ridenour, 1985, p. 69, no. 39).
324	Prospect (T14N, R13E, sec. 11)	A massive, white quartz vein is in white quartzite.	One shallow pit.	One grab sample; trace gold, no silver was detected, 105 ppm copper (Ridenour, 1985, p. 69, no. 41).
325	Prospect (T14N, R13E, sec. 11)	A quartz vein is in muscovite schist.	One caved adit, estimated at <30 ft long, and two shallow pits.	Two grab samples: one contained a trace gold (Ridenour, 1985, p. 69, no. 38).
326	Loon Creek quartz vein (T14N, R13E, sec. 10)	Precambrian muscovite schist contains a lightly hematite-stained quartz pod about 2.5 ft by 8 ft; with a few remnant sulfide boxwork structures and no visible sulfide minerals.	None.	One chip sample: no gold or silver was detected, 30 ppm copper, 60 ppm lead, 97 ppm zinc (Ridenour, 1985, p. 69, no. 37).
327	Prospect (T14N, R13E, sec. 14)	Vuggy, iron-oxide-stained quartz is hosted by muscovite schist.	Two caved adits totalling an estimated 400 to 500 ft long, one shallow pit.	One grab sample: 0.076 oz/ton gold and 0.3 oz/ton silver (Ridenour, 1985, p. 69, no. 36).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
328	Monte Cristo mine (T14N, R13E, sec. 14) Dike Williams; First Eagle Co.	Quartz veins are in a roof pendant of chlorite-muscovite schist underlain by Cretaceous quartz monzonite. A rocky soil covers most of the area; no outcrops occur in the immediate vicinity of the mine workings. Dump material indicates one or more quartz veins were intersected. Some dump specimens of vein material are 1-ft thick.	Three caved adits totalling more than 1,000 ft in length; six pits or open cuts. Adits were reportedly driven a total of 1,790 ft in 1934 (Simons, 1934, p. 142). No production is known.	The Monte Cristo mine may have silver-gold resources, but they are likely to be limited because of the small size of the host roof pendant. Four grab samples contained 0.02 to 0.344 oz/ton gold, and three contained 0.0 to 1.9 oz/ton silver. One sample contained 8.46% lead. A soil geochemistry survey revealed a 540-ft-long zone over the mineralized zone with anomalous gold (Ridenour, 1985, p. 56-59,62).
329	Prospect (T14N, R12E, sec. 35)	Iron-stained shear zone in altered schist (Leszcykowski and others, 1983, Appendix, no. 11)	Shallow pit (Leszcykowski and others, 1983, Appendix).	One chip sample: no anomalous mineral content (Leszcykowski and others, 1983, Appendix).
330	Prospect (T13N, R13E, sec. 6)	Iron-stained, sulfide-bearing metasedimentary xenolith in quartz monzonite (Leszcykowski and others, 1983, Appendix, no. 12).	Shallow pit (Leszcykowski and others, 1983, Appendix).	One chip sample: no anomalous mineral content (Leszcykowski and others, 1983, Appendix).
331	Francisco (T14N, R12E, sec. 34)	Iron-oxide stained pyrite and arsenopyrite-bearing quartzite xenolith in quartz monzonite (Leszcykowski and others, 1983, Appendix, no. 13).	Two shallow pits (Leszcykowski and others, 1983, Appendix).	One chip sample: no anomalous mineral content (Leszcykowski and others, 1983, Appendix).
332	Prospect (T14N, R12E, sec. 34)	Iron-oxide stained, pyrite-bearing metasedimentary xenolith in quartz monzonite (Leszcykowski and others, 1983, Appendix, no. 14).	One open cut (Leszcykowski and others, 1983, Appendix).	One chip sample: no anomalous mineral content (Leszcykowski and others, 1983, Appendix).
333	Prospect (T13N, R13E, sec. 6)	Quartz-fibrous calcite fracture-filling in iron-stained quartz monzonite (Leszcykowski and others, 1983, Appendix, no. 17).	Shallow pit (Leszcykowski and others, 1983, Appendix).	One grab sample: no anomalous mineral content (Leszcykowski and others, 1983, Appendix).
334	P-W 83 and 84 (T13N, R13E, sec. 6)	Iron-oxide stained, silicified schist xenolith in quartz monzonite (Leszcykowski and others, 1983, Appendix, no. 15).	Five shallow pits (Leszcykowski and others, 1983, Appendix).	Six samples (five chip, one grab): no anomalous mineral content (Leszcykowski and others, 1983, Appendix).
335	Prospect (T13N, R13E, sec. 6)	Silicified iron-stained schist (Leszcykowski and others, 1983, Appendix, no. 16).	Shallow pit (Leszcykowski and others, 1983, Appendix).	One chip sample, no anomalous mineral content (Leszcykowski and others, 1983, Appendix).
336	Do-J No. 1 (T13N, R13E, sec. 6) James Herndon	Four siliceous iron-stained shear zones in quartz monzonite, some metasedimentary xenoliths (Leszcykowski and others, 1983, Appendix, no. 18).	Two small adits, 8 ft and 20 ft long, two pits (Leszcykowski and others, 1983, Appendix).	Five samples: one contained 0.036 oz/ton gold, another contained 0.2 oz/ton silver; the others contained no anomalous mineral content (Leszcykowski and others, 1983, Appendix). One sample in 1956 contained 16.5% iron and 8.85% sulfur (USBM, 1988).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
337	Phonta-Williamson (T14N, R12E, sec. 32)	Limonite-stained silicified metasedimentary rock xenoliths are in quartz monzonite. The xenoliths are phyllitic to schistose and some have shear zones as well as quartz veins. The xenoliths range in size from a few feet to several hundred feet long; most have disseminated pyrite and some have disseminated arsenopyrite. Two of the largest blocks contain shear zones mineralized by sulfide-bearing siliceous hydrothermal solutions. These shear zones are 4- to 5-ft wide, generally parallel to the foliation of the metasediments, and contain pyrite, arsenopyrite, sphalerite, galena, gold, and an unidentified silver-bearing mineral.	Five pits and three adits 130-ft, 96-ft, and 12-ft long. No known production but several tons of ore are stockpiled at the portal of one adit.	Fourteen samples of shear zones and metasediments: 0.26 and 0.006 oz/ton gold in two of twelve chip samples and 1.0, 1.1, 1.4, 1.4, 1.8, 3.0, and 5.4 oz/ton silver in seven chip samples; eleven chip samples averaged 0.33% lead and 0.15% zinc. Two grab samples contained 8.0 and 86.2 oz/ton silver, and one grab sample contained 0.058 oz/ton gold; the two samples contained 0.37% and 1.44% lead and one contained 0.92% zinc (Ridenour, 1985, p. 75, no. 93).
338	Winn B prospect (T13N, R12E, sec. 10)	Fine-to-medium-grained quartz monzonite is at the prospect.	One small open cut.	One chip sample: no gold or silver was detected (Ridenour, 1985, p. 75, no. 92).
339	Prospect (T13N, R12E, sec. 15)	Quartz monzonite is crosscut by aplite dikes.	One shaft, two open cuts, and two bulldozer cuts.	Two chip samples of monzonite: no gold or silver was detected (Ridenour, 1985, p. 75, no. 91).
340	Horn 1-163 (T13N, R12E, sec. 33) American Copper & Nickel	Challis Volcanics and Idaho batholith (Worl and others, 1989).	A 1981 plan of operations calls for eight diamond- or air-track percussion holes as part of a uranium exploration program (USFS, 1988).)	No data.
341	Geothermal location (T12N, R11E, sec. 2) Bradley Scout Camp	Hot spring at Bradley Scout Camp (USBM, 1988).	No data.	No data.
342	Boo Berry Hill (T12N, R11E, sec. 10) C. M. Hughley	A small spring runs from the side of a hill and flows 100 ft before entering Cape Horn Creek (USFS, 1988).	A 1980 plan of operations calls for use of a 2.5-in suction dredge and recreational panning. (USFS, 1988).	No data.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
343	Passover 1-36 (T11N, R11E, sec. 9) Fred Proctor	Hornfels and iron-stained metasediments occur in a shear zone between volcanic rocks and schist. The zone is up to 100 ft wide and extends more than 1,000 ft across the west side of Copper Mountain at about N20°-40°E. Hornfels within the zone is iron- and copper-stained along fractures (USBM, 1988).	A 100 ft cut across a shear zone. About 1,000 ft north of the open cut is a caved adit with sheared hornfels on the dump (USBM, 1988).	A random chip of iron- and copper-stained hornfels from the face of an open cut contained no gold, 27 ppm silver, 1,650 ppm copper, 5,800 ppm lead, 12,200 ppm zinc. A select sample of malachite- and azurite-coated hornfels from a 100 ton-dump at an open cut contained no gold, 63 ppm silver, 5,800 ppm copper, 2.89% lead, 2.08% zinc, no molybdenum and no tungsten. A select of a 100-ton stockpile with 75% malachite- and azurite-coated hornfels, and quartz contained no gold, 51 ppm silver, 7,500 ppm copper, 6,800 ppm lead, 1% zinc (USBM, 1988).
344	Panic 1-108 (T13N, R13E, sec. 29) American Copper & Nickel Co.	Idaho batholith (Worl and others, 1989)	A 1980 plan of operations calls for diamond drill holes of not more than 500 ft as part of a uranium exploration program. (USFS, 1988).	No data.
345	Dominion (T12N, R13E, sec. 5) American Copper & Nickel Co.	Challis Volcanics and Idaho batholith (Worl and others, 1989).	As part of a uranium exploration program, five sample holes were drilled in 1980 (USFS, 1988).	No data.
346	Misty Mountain group (Lazy Susan) (T13N, R14E, sec. 19) Misty Mountain Mining Co.	Heavily iron-oxide-stained, silicified felsite.	None.	One chip sample: no gold or silver was detected (Ridenour, 1985, p. 68, no. 30).
347	A R M P group (T13N, R14E, sec. 20)	Quartz monzonite contains quartzite and phyllite xenoliths (Ridenour, 1985, p. 68).	None (Ridenour, 1985, p. 68).	Two chip samples, one of quartzite the other of phyllite: no gold or silver detected (Ridenour, 1985, p. 68, no. 29).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
348	Hindman (T12N, R13E, sec. 1) Jack Niece	The claims are located 1.25 mi southwest of Red Mtn, at the west end of a fractured and mineralized zone which is 800 ft wide and at least 2 mi long. The zone trends N55°E in Challis Volcanics, and is cut by small light colored dikes. Mineralized fractures strike N70°E and N40°E and dip 60°SE to 80°SE. Mineral deposition is confined to narrow seams and stringers not more than a few inches wide. Some rock contains recognizable pyrite and gold (Anderson, 1949, p. 36).	Two adits on the southwest side of the ridge have 2,000 ft of underground workings each. Several cuts and small openings (Anderson, 1949, p. 36). Drilling programs on the Red Mtn Group have explored this general area (USFS, 1988).	Samples across the entire mineralized zone contained $2 to $4 per ton in gold and silver (Anderson, 1949, p. 36).
349	Park Creek Silver (T12N, R14E, sec. 6) Jack Niece	Highly-fractured, hydrothermally altered Challis Volcanics. Gold and silver occur in narrow shoots in quartz veins and in wide but low-grade breccia zones (Choate, 1962, p. 95).	A prospect pit was sunk by Eddie Martin on a silver vein at the base of Red Mtn on the north side of Park Creek. According to Martin, the vein was 2 ft wide and struck northeast. Work was halted due to an influx of spring water (Choate, 1962, p. 95). Drilling programs on the Red Mtn Group have explored this general area (USFS, 1988).	According to Martin, the vein contains up to 600 oz/ton silver (Choate, 1962, p. 95).
350	Crystal claim (T12N, R14E, sec. 6) Jack Niece	Highly-fractured hydrothermally altered Challis Volcanics. Gold and silver occur in narrow shoots in quartz veins and in wide but low-grade breccia zones (Choate, 1962, p. 94).	The main workings on Red Mtn consist of two adits, caved at the portal, on Rupert Niece's claim. The adits, driven in the old days, reportedly contained up to 300 oz/ton silver. No information is available on the thickness of the veins (Choate, 1962, p. 95). Drilling programs on the Red Mtn Group have explored this general area (USFS, 1989).	A sample taken from the dump of the north adit contained 0.44 oz/ton gold and 2.88 oz/ton silver. (Choate, 1962, p. 95).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
351	Red Mountain (T12N, R13E, sec. 1) Jack Niece	Known mineralization in the Red Mtn area is exposed in a zone several hundred yards wide and about 2 mi long, that trends N45°E to N50°E from Hindman Peak ridge to Red Mtn. The zone is composed of fractured and hydrothermally altered Challis Volcanics. Quartz veins occur within breccia zones and contain shoots with silver and gold (Choate, 1962, p. 94).	There are several groups of workings along the zone from Red Mtn to Hindman Peak ridge. See Park Creek Silver, Crystal Claim, Hindman, and Independence for individual property descriptions. Within the Red Mtn group, which covers this entire area, two drilling programs have been undertaken. In 1982, Noranda Exploration driled 4 deep holes on Red Mtn, reportedly exploring for molybdenum. One hole was 2,200 ft deep. In 1984, Tenneco Minerals drilled 35 shallow holes on Hindman ridge to evaluate gold potential. The property is currently leased to Sun Gold Exploration. The company plans to do mapping and drilling in 1988 and beyond (Niece, Jack personal commun., 1988).	No data.
352	Independence (T12N, R13E, sec. 12) Jack Niece	Highly-fractured hydrothermally altered Challis Volcanics. Gold and silver occur in narrow shoots in quartz veins and in wide but low-grade breccia zones. Dump material at the property contained fine-grained and drusy quartz, fine-grained pyrite, and colorless to pale lavender fluorite. A quartz vein along the fault reportedly contained a high-grade shoot that ranged in thickness from 1 to 4 in. (Choate, 1962, p. 94).	Two adits, a large prospect pit, and smaller pits. The pit was sunk along a northeast-striking fault that dips steeply northwest. A 25-ft adit and a 35-ft adit, down slope from the pit, both driven in 1959, do not intercept the veins exposed in the pit (Choate, 1962, p. 94). Drilling programs on the Red Mtn Group have explored this general area (USFS, 1988).	In the main pit, a 5 ft sample, cut across an intersecting vein reportedly contained $20/ton in gold and silver as did a composite sample taken at random from the dump. Nineteen of 26 samples contained gold and silver values ranging from $1 to $44: five selected samples ranged in value from $100 to $356. A weighted average (obtained by dividing all the values over $100 by 10) of these 26 samples is $16/ton. The ratio of silver to gold for the 26 samples was 5:1 (Choate, 1962, p. 94).
353	West Fork of Yankee Fork (T12N, R14E, sec. 7)	Placer gravels occur along the West Fork of Yankee Fork and one of its tributaries, Cabin Creek. Much of the gold in the streams was probably contributed by the mineralized zone that crosses Hindman Ridge and Red Mtn (Choate, 1962, p. 120).	A small amount of hand placering has been done at the nose of Hindman Ridge. A drag-line similar to the one used on Jordan Creek should be able to operate successfully in this area. The Yankee Fork dredge was too large to traverse the narrows leading to this area (Choate, 1962, p. 120).	The ground was tested by the owners of the Yankee Fork Dredge. High gold values were reported, however no assay values were presented (Choate, 1962, p. 120).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
354	Aspen #4 (T12N, R13E, sec. 36)	A fault zone at an attitude of N42°W, 70°NE lies within quartz monzonite. The 4 ft thick zone is brecciated and contains pods up to 4 in thick and several ft long. The pods contain secondary uranium minerals (Choate, 1962, p. 50).	Several shallow bulldozer cuts (Choate, 1962, p. 50).	Maximum radioactivity measured was 0.45 milliroentgen/hour (Choate, 1962, p. 58).
355	Little Bill mine (T11N, R13E, sec. 1)	Most of the rock exposed in this area is quartz monzonite or granodiorite. Challis Volcanics crop out along the ridges east of Basin Creek. Several easterly-trending, porphyry dikes cut granitic rocks north of Hay Creek. Secondary uranium minerals occur mainly as coatings on fractures (Choate, 1962, p. 48).	Lightning #2- located just south of Hay Creek. A 250 ft cut across a mineralized fault zone which strikes N38°W. A 50 ft adit and a shorter adit below it were driven along the fault zone. In 1959, 271 tons of development ore at a grade of 0.15% U_3O_8 were shipped. In 1960, 420 tons of ore at a grade of 0.18% U_3O_8 were shipped. Lightning #1- 820 ft northeast from the lightning #2. A 43 ft adit lies along a brecciated and altered fault contact between granodiorite and a porphyry dike which strikes N67°E and dips 65°SE. Anomalous radioactivity occurs along fractures. Lightning Upper Pit- 400 ft southeast from the Lightning #1. The pit is about 1,500 ft long and 80 ft wide. Production of 48 tons of ore at a grade of 0.28% U_3O_8. Shipped ore contained mostly secondary yellow uranium minerals, but some pitchblende was uncovered at the base of the pit. Ore contained minor stibnite (Choate, 1962, p. 48).	Lightning #2- Polished sections of pitchblende stringers from the adits contain minor pyrite, gold, and molybdenite in vein quartz. A grab sample contained; Fe, 4%; Zn,3%; Ti, 0.5%; Ba, 0.4%; Mo, 0.2%; Ce, 0.09%; Sb, 0.07%; Mn, 0.04%; La, 0.04%; Pb, 0.01%; Sr, 0.09%; and U_3O_8, 1.22%. Ore grade mineralization is restricted to a steeply pitching shoot 25 ft long and 4 ft to 5 ft wide. A test hole intercepted the vein 65 ft below the adits. The vein is 7.5 ft thick with 1.42% U_3O_8 (Choate, 1962, p. 48). Lightning Upper Pit- A fault at an attitude of N60°W, 70°NE is exposed in the pit and probably extends to the northwest toward the Baker Property. (Choate, 1962, p48)

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
356	Baker (T12N, R13E, sec. 35)	Host rocks in the area are quartz monzonite, with several small aplite and pegmatite dikes. Autunite is disseminated throughout weathered quartz monzonite and along closely spaced fractures and chalcedony stringers. Mineralization at the Baker property is along the same set of faults as at the Lightning and Aspen properties (Choate, 1962, p. 51).	One pit is 60 ft long, 30 ft wide, and about 10 ft deep. Approximately 30 tons of ore had been stockpiled (Choate, 1962, p. 51).	Radioactivity of 0.70 and 2.30 milliroentgen/hour have been measured in the pit. Grade of the ore pile is probably between 0.30% and 0.40% U_3O_8 (Choate, 1962, p. 51).
357	Golden Day (Golden Ray) mine (T11N, R13E, sec. 2) Ray Gleason	Iron-stained granitic rock cut by quartz veins and stringers. Two veins were worked: the lower adit intercepts a vein with attitude of N72°E, 75°NW, the upper adit was driven along a vein with attitude of N85°W, 85°NE. The veins range in thickness from 0.75 in to 10 in and pods occur along the vein up to 3 ft thick (Choate, 1962, p. 92).	Workings consist of an upper adit of 110 ft, a 50 ft shaft, a lower adit of 280 ft, and numerous shallow pits. Two shipments of ore were made in 1937. The first shipment of 1,848 lb contained 1.74 oz/ton gold and 14.6 oz/ton silver. The second shipment of 19,430 lb contained 0.56 oz/ton gold and 3.2 oz/ton silver. Work was resumed in 1941 but was halted by government decree in 1942. Settlement assays show that the 10 ton ore shipment contained in addition to gold and silver, 5.1% iron, 2.3% lead, 0.5% zinc, 0.1% arsenic, and 0.7% sulfur (Choate, 1962, p. 92). A 1981 plan of operations calls for exploration of tunnel and dump sites with a small backhoe (USFS, 1988).	The richest ore is reported to have occurred in kidneys up to 18 in across along the vein. Pods of ore up to 3 ft thick are also reported along the veins in underground workings (Choate, 1962, p. 92).
358	Enterprise (T11N, R13E, sec. 2)	Country rock is quartz monzonite. Exploration has been along a slightly-mineralized fault zone that strikes N30°-50°W and dips southwest. Fractures and silicic stringers are moderately radioactive where exposed (Choate, 1962, p. 54).	Development consists of three bulldozer cuts and an adit. The adit follows the most conspicuous fault for 450 ft. Up to 8 in of gouge and 2 ft of breccia occur along the fault (Choate, 1962, p. 54).	Underground, maximum radioactivity of 0.50 milliroetgen/hour was measured along the fault (Choate, 1962, p. 55).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
359	Genesis (H & M) (T11N, R13E, sec. 10) Pery Deford	Most of the rock exposed on the property is porphyritic quartz monzonite that has been intruded by aplite and pegmatite dikes. At the main pit, the rocks have been silicified for approximately 50 ft on each side of a chalcedony vein (Choate, 1962, p. 59).	Development consists of seven bulldozer pits, aligned one above the other on the southeast slope of Potato Mountain (Choate, 1962, p. 58). A 1984 plan of operations calls for assessment of existing cuts and diggings (USFS, 1988).	No metallic minerals have been exposed, and maximum radioactivity of 0.10 milliroentgen/hour was measured along the chalcedony vein (Choate, 1962, p. 59).
360	Main Diggings (T11N, R13E, sec. 11)	Quartz monzonite country rock has been intruded by pegmatite and rhyolite dikes. Chalcedony veinlets are exposed in iron-stained quartz monzonite (Choate, 1962, p. 59; Kern, 1959, p. 23).	A number of bulldozer cuts along the slopes east and west of the east fork of Sawmill Creek (Choate, 1962, p. 59).	A maximum radioactivity of 0.11 milliroentgen/hour was measured in the cuts on the property (Choate, 1962, p. 59).
361	Bell Cross (T11N, R13E, sec. 10)	Country rock is quartz monzonite that has been intruded by aplite dikes and chalcedony veinlets. The rocks are silicified and highly fractured. Uraninite is disseminated in minor amounts throughout the chalcedony veins and stringers. Small zones, enriched in urananite occur where veins intersect aplite dikes (Choate, 1962, p. 58).	Several development pits are on the property. The main pit is over 200 ft long, 100 ft wide and 45 ft deep. No increase in mineralization has been exposed with depth, and the widest vein exposed is one ft wide (Choate, 1962, p. 58). No ore shipments have been recorded (Choate, 1962, p. 58).	A chip sample across the vein in the main pit contained 0.60% and 0.73% U_3O_8. A grab sample of chalcedonized aplite from pits 2,000 ft northwest of the main pit contained 0.08% U_3O_8. Cinnabar was reportedly uncovered during excavation of the main pit. A sample from the pit contained 0.2% HgO (semiquantatative spec analysis) (Choate, 1962, p. 58; Kern, 1959, p. 22). In 1956, four samples across veins less than 2 ft thick assayed 0.021% to 0.06% U_3O_8 (USBM, 1988). No resources are expected with further development (Choate, 1962, p. 58; Kern, 1959, p. 22).
362	Chinese placer (T11N, R13E, sec. 14)	Kelly Creek, from Sawmill Creek to a point 1.25 mi downstream, is very narrow. Placer ground was less than a hundred feet wide and only a few feet deep (Choate, 1962, p. 110).	Much of the gravel along this section of the creek was placered. No evidence of recent activity (USBM, 1988).	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
363	Weidman placer (Faith # 4) (T11N, R13E, sec. 15) Viola Evans, George Castle	Placer ground lies on a wide pass between Kelly Creek and Doran Gulch. The average thickness of overburden is 10 ft. Bedrock is granitic rock which is deeply weathered and iron stained and locally silicified. Several porphyritic dikes cross the placer. Weidman stated that pay dirt started at 4.5 ft above bedrock and was richest in the lower 18 in (Choate, 1962, p. 110).	Placered ground is about 1,600 ft long by 400 ft wide. The ground was mostly worked in the 1930's with a giant and sluice box for gold recovery (Choate, 1962, p. 110). Viola Evans owns about 400 acres of placer claims. George Castle currently leases a small portion of the claim block and has a seasonal placer gold recovery operation. Overburden is removed with a bulldozer and placer material is fed to a 20 ton/hour maximum capacity wash plant with a front end loader. The plant consists of a spiral trommel, Wilfley table, and a final stage spiral concentrator. Production figures are not available. Mr. Castle indicated that he is interested in maintaining the long term lease agreement to continue operations and that testing indicates that there are resources to support many years of operation (USBM, 1988).	Weidman could not estimate production and his only test of the material had a grade of \$1.63/yd^3 gold (Choate, 1962, p. 110). A 1.9 million yd^3 placer gravel resource was identified during a 1952 USBM drilling study. The gravel was estimated to contain 8.16 lb/yd^3 black sand. The black sand contains 4.92 lb/yd^3 ilmenite, 1.41 lb/yd^3 magnetite, 0.13 lb/yd^3 monazite, 0.03 lb/yd^3 garnet, and 0.01 lb/yd^3 zircon. Monazite from one churn drill sample was 4.94% ThO_2 and 0.21% U_3O_8. A plan of operations for continued work was filed in 1987 (USFS, 1988).
364	Sturkey placer (T11N, R13E, sec. 15)	Placered ground, 420 ft in diameter, with depth to bedrock of about 15 ft, lies on the northwest side of Kelly Creek, 2.8 mi from the creek mouth. Placer ground was reported to contain 8.2 lb/yd^3 black sands (Choate, 1962, p. 109).	Water for hydraulic operations was stored in an earth-fill reservoir. Water was supplied by 7.5 mi of hand dug ditches from Stanley and Sawmill Creeks. Overburden above pay dirt was removed by two giants; pay dirt was sluiced. Jesse Lynch, of Stanley, stated that \$87,000 in gold had been produced from the placer. Most of the gold was produced prior to 1900; however, sporadic work continued until the early 1920's (Choate, 1962, p. 109).	John Weidman, of Stanley, stated that Sturkey only used a rise of 0.5 in/ft for his sluice box; therefor, much of the gold was lost because of the heavy load of black sands (Choate, 1962, p. 109).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
365	Wonder 19 Extended (T11N, R13E, sec. 22) S. A. Jackson	Alluvium is on deeply-weathered and iron-stained granitic bedrock of the Idaho batholith. A pay streak of fine gravel and sand varies in thickness and was less than 1 ft thick where exposed in sample trenches. This layer is near bedrock and is covered by 7 to 8 ft of silty overburden where exposed (USBM, 1988).	A 1986 plan of operations proposes running a 2-in suction dredge on an intermittent stream for testing and sampling purposes (USFS, 1988). The operators are evaluating the property using trenches and bulk sampling. They indicate that they have water rights and plan to process samples through a sluice. (S.A. Jackson, personal commun., 1988).	An assay report from Alpine Assayers was provided by the owner. A 50 lb sample was reduced to 854 gm of black sand concentrate. This concentrate was analyzed and found to contain 1.06 oz/ton gold and 0.66 oz/ton silver. The gold analysis was converted to a value of 0.062 oz/yd^3 gold (USBM, 1988).
366	Second Chance (Silver Dollar) (T11N, R13E, sec. 15) Bill Yearsly	A surface exposure of antimony is reported. Granitic rocks of the Idaho batholith underlie the area.	During 1980, drilling and sampling of 10 to 25 holes was proposed; 1987 plans called for sinking a shaft (USFS, 1988).	No data.
367	Willow group (Willis group) (T11N, R13E, sec. 22) Ken Grayson	Jesse Lynch of, Stanley ID, stated that the shallow overburden, about 3 ft thick, along the upper stretches of Kelley Creek contains rich but erratically located "grass root" placer deposits. Willow Flats is a small meadow located near the head of Kelley Creek (Choate, 1962, p. 109).	Most of the small workings in this area are on gravel benches rather than along the stream channel. A plan of operations was filed in 1983, and detailed the evaluation of small test pits near Joes Gulch jeep trail (Choate, 1962, p. 109). Mr. S.A. Jackson indicated that he and co-owners are testing and bulk sampling placer material at several locations. Test pits revealed 3 ft to 6 ft of fine silt and thin layers of <1 in. size gravel above weathered granitic bedrock (S.A. Jackson, personal commun., 1988).	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
368	Kelly & Joe (T11N, R13E, sec. 15) Martin Pollock	Three rhyolite dikes are in granitic rocks of the Idaho batholith. One dike is reportedly 50 to 150 ft wide and traceable for 13,000 ft along strike (USFS, 1988). Rhyolite is exposed in shallow pits on the ridge west of the Iron Crown mine in Joes Gulch, in road cuts about 0.5 mi northwest of the Iron Crown mine on the ridge between Joes Gulch and Kelly Creek, and at several locations along the southern fork of Kelly Creek, north of the Iron Crown mine (USBM, 1988).	A 1986 plan of operations calls for bulk sampling of dike material and future drilling program. A sample processing plant and settling ponds are proposed (USFS, 1988). Three shallow pits west of the Iron Crown mine (USBM, 1988).	The operator reports gold and rare earth minerals are present in the dike (USFS, 1988). A random chip sample of rhyolite with pyrite casts from a small prospect pit on the ridge 1/4 mi west of the Iron Crown mine contained no gold, 0.1 ppm silver, 46 ppm copper, 118 ppm lead, 146 ppm zinc, 195 ppm cerium, <.2 ppm europium, 49 ppm lanthanum, 0.5 ppm lutetium, 37 ppm neodymium, 5.3 ppm samarium, 1.6 ppm terbium, 26 ppm thorium, 4 ppm uranium, 2.8 ppm ytterbium (USBM, 1988). A random chip sample of rhyolite and tuff from a second shallow pit on the ridge 1/4 mi west of the Iron Crown mine contained no gold, 0.1 ppm silver, 16 ppm copper, 50 ppm lead, 80 pm zinc, 209 ppm cerium, 0.7 ppm europium, 85 ppm lanthanum, 0.5 ppm lutetium, 44 ppm neodymium, 9.1 ppm samarium, 2.0 ppm terbium, 26 ppm thorium, 5 ppm uranium, 3.3 ppm ytterbium (USBM, 1988). A grab sample of fine-grained rhyolite with disseminated pyrite and iron-oxide stain along fractures taken from a small pit along the southern fork of Kelley Creek about 1 mi north of the Iron Crown mine contained no gold, 0.1 ppm silver, 4 ppm copper, 20 ppm lead, 57 ppm zinc (USBM, 1988).
369	Upper Noho Creek (T11N, R13E, sec. 23)	A 2-in auriferous quartz vein is exposed in a prospect pit along the upper reaches of Noho Creek. The pit is near an old cabin. Nearby float contains up to $90/ton gold (Choate, 1962, p. 96).	No evidence of underground development or recent activity (USBM, 1988).	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
370	Iron Crown (T11N, R13E, sec. 22) Walter Paul	A rhyolite porphyry dike strikes N8°W and dips 62°-80°NE. The dike is about 30 ft wide and is offset 45 ft by a high angle fault. Mineralization is along irregularly spaced fractures in the dike. Quartz, pyrite and native gold and silver occur along the fractures (Choate, 1962, p. 90).	A lower adit, caved, a middle adit, 316 ft long, and upper adit, 98 ft in length. An abandoned 5 stamp mill was constructed about 1912, and several attempts to operate the mill were economically unsuccessful (Choate, 1962, p. 90). In 1980 an open-pit mine, cyanide heap-leach recovery project was begun on the deposit. Some stripping of the orebody and construction of a leach pad was done (USFS, 1988). No evidence of recent activity in 1988 (USBM,1988).	The ore shoot under development in 1905 carried \$10-\$12/ton (gold at \$20.67/oz). Approximately 100 hand samples from dumps contained 0.51 oz/ton gold, 0.43 oz/ton silver (Choate, 1962, p. 91). A random grab sample of rhyolite porphyry with pyrite from the dump contained 100 ppb gold, 20 ppm silver, 15 ppm copper, 22 ppm lead, 43 pm zinc, 71 ppm cerium, 0.4 ppm europium, 23 ppm lanthanum, 0.5 ppm lutetium, 25 ppm neodymium, 6.2 ppm samarium, 1.2 ppm terbium, 27 ppm thorium, 4 ppm uranium, 3 ppm ytterbium (USBM, 1988). A random chip of rhyolite porphyry from the west rib of the adit contained 40 ppb gold, 0.1 ppm silver, 8 ppm copper, 20 ppm lead, 42 ppm zinc, 85 ppm cerium, <0.5 ppm europium, 29 ppm lanthanum, 0.5 ppm lutetium, 32 ppm neodymium, 6.2 ppm samarium, 1.1 ppm terbium, 23 ppm thorium, 3 ppm uranium, 2.4 ppm ytterbium (USBM, 1988).
371	Joes Gulch placer mine (T11N, R13E, sec. 26) Mark Anderson	Alluvium is on granitic bedrock of the Idaho batholith along a narrow, steep sided portion of Joes Gulch.	A 1986 plan of operation proposed mining of placer gravels along upper Joes Gulch using a small suction dredge and sluice (USFS, 1986). Mark Anderson is currently conducting small scale placer operations with a small tractor, a portable screen, and a trommel. About 6 ft of angular alluvium is removed to expose bedrock which is then hand picked along the narrowest part of the gulch.	Choate (1962, p. 102-3 and fig. 49) identified placer gravels along 1.4 mi of Joes Gulch, and gives a tentative gold value by area of \$3.60/yd^{3} (gold at \$35/oz) in heavy mineral assemblages high in monazite and low in magnetite and ilmenite.
372	Elkhorn (T11N, R13E, sec. 25)	Two claims have reportedly been staked on radioactive anomalies that occur in granitic rocks along Elkhorn Creek (Choate, 1962, p. 75).	No evidence of recent activity (USBM, 1988).	No data.
373	Horseshoe (Bright Star 6,10,15) (T11N, R13E, sec. 24) First Eagle Corp.	Bill Brooks and Melvin Peterson hold two Horseshoe claims staked on granitic rock that they report to be highly radioactive; the claims are 1.5 mi up the first large gulch south of Noho Creek (Choate, 1962, p. 75)).	A 1980 plan of operations calls for minor blasting to expose veins. A 1984 plan of operations calls for backhoe and bulldozer excavation of trenches to bedrock (USFS, 1988).	A grab sample of quartz-vein material from the dump of caved adit contained 30,136 ppb gold, 3.72 oz/ton silver, 9,000ppm copper, 9,800 ppm lead, 600 ppm zinc and has a scintillometer reading of 60 cps (USBM, 1988).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
374	Kelly Creek placer (T11N, R14E, sec. 18) Bill Broks, Melvin Peterson	Included in Weidman Placer (355). Bedrock in this area is granitic rock of the Idaho batholith. Placer gravels are erosion products of the batholith rocks with isolated occurrences of ancient glacial moraines and rounded fragments of volcanic rocks. There is evidence of placer working wherever the volcanic fragments are present, suggesting the most productive gravels may be remnant ancient placers within recent gravels. (USBM, 1988)	See Weidman Placer (355) and Sturkey Placer (357)	In 1952, the USBM conducted a sampling program in an area 1 mi long and 900 ft wide that extends along the Sturkey and Weidman workings and extended 0.5 mi further up Kelly Creek. 15 holes were drilled from 5 to 30 ft deep and volume in the Kelly Creek gravels were estimated at 1,912,000 yd^3. Samples contained amounts of the following minerals in units oflb/yd^3: Black sand 8.16, Ilmenite 4.92, Magnetite 1.41, Garnet 0.03, and Zircon 0.01. (USBM, 1988)
375	Copper Creek occurence (T11N, R14E, sec. 19) Harry McClure	Harry McClure reported in Cook (1956, p. 30) finding tungsten mineralization (powellite) in recrystallized limestone on Copper Creek.	No evidence of workings were observed in this area in 1988 (USBM, 1988).	No data.
376	Bright Star (T11N, R14E, sec. 30) First Eagle Corp.	A shear zone from 60 ft to 120 ft wide composed of closely spaced faults, veins and lenses of brecciated wall rock. The zone is in quartz monzonite with rhyolite dikes. Veins range from a fraction of an inch to 3 ft thick, and contain quartz, fluorite, pyrite, and native gold (Choate, 1962, p. 81).	Three adits, two shafts, and several pits and trenches. The 40 ft and 90 ft shafts are partially water filled, two adits are caved at the portals and on is reported at 500 ft long. The prospect has been explored for gold and silver, fluorite, and uranium (Choate, 1962, p. 80). A 1984 plan of operations calls for backhoe and bulldozer excavation of six exploratory trenches (USFS, 1988). No production is recorded, but a few tons of hand cobbed gold ore may have been shipped (Choate, 1962, p. 81).	A 10-ft chip sample along a quartz vein in the open adit contained a trace gold and silver, a 1.5-ft chip across a fluorite vein contained 91.5% CaF$_2$. Two select samples of vein quartz contained 0.15 oz/ton gold and 0.27 oz/ton gold; 1.1 oz/ton silver and 1.1 oz/ton silver. No anomalous radioactivity detected (Tschanz and others, 1974, p. 601). A grab sample of vein material from the dump of the uncaved adit contained 0.74 oz/ton gold and 15.58 oz/ton silver. A quartz sample submitted to the USBM contained tellurium in trace amounts (Choate, 1962, p. 83).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
377	Hide Out (T11N, R14E, sec. 19) First Eagle Corp.	Adit along a 2 ft to 3 ft thick, northerly-trending shear zone. One prospect pit exposes a 2 ft-thick shear zone that strikes N20°W, dips 80°SW and contains quartz and fluorite (Tschanz and others, 1974, p. 603).	A 120 ft adit, 2 caved adits, 2 prospect pits and several bulldozer cuts (Tschanz and others, 1974, p. 603). A 1984 plan of operations calls for backhoe and bulldozer excavation of three exploratory trenches (USFS, 1988). Claim notice on the property for Big Copper #8, Big Paw Mines Inc., Jerome Anderson and Oscar Paulson.	One chip sample of a silicified shear zone in an adit: no mineral values. Chip sample across quartz-fluorite zone in pit, 39.7% CaF_2 (Tschanz and others, 1974, p. 603). Select sample of dump material containing massive quartz and granitic rock with quartz stringers. Pyrite in and along quartz stringers and disseminated through granite. The sample contained 350 ppb gold, 1.8 ppm silver, 3 ppm copper, 30 ppm lead, 22 ppm zinc (USBM, 1988).
378	Shorty mine (T11N, R14E, sec. 7)	The Shorty, Sunday, Lazy Jack properties extend from Hay Creek to Coal Creek. The Shorty pit is on a fault zone that strikes N5°-10°E. Bedded sedimentary rocks and challis volcanics on the northeast of the fault have been down faulted against quartz monzonite on the southwest. Uranium mineralization occurs in bedded sedimentary rocks. The mineralized zone extends across 40 ft of the fault zone and along the zone for 80 ft. Ore from the Shorty pit contains uraninite, coffinite, pyrite, and marcasite (Choate, 1962, p. 70; Kern, 1959, p. 26).	One large open pit and one smaller pit. Production of 1,400 tons of ore at 0.14% U_3O_8 and about 350 tons at 0.18% U_3O_8 and stockpiles of 1,000 to 1,500 tons at 0.10% to 0.15% U_3O_8 from the large open pit (Choate, 1962, p. 70).	The 40 ft by 80 ft mineralized zone seems to be bounded by unmineralized rocks across the bounding faults (Choate, 1962, p. 70).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
379	East Basin mine (T11N, R14E, sec. 8) Silco Mining Co.	Mineralization at the East Basin pit is mainly restricted to a 3-ft basal bed of Challis sedimentary rocks that overlies quartz monzonite. Conglomerate forms the lower 6 in of the mineralized bed; arkosic sandstone forms the upper 2.5 ft. A hard, massive, arkosic sandstone overlies the ore bed. Mineralization within the ore bed is very unevenly distributed. Uranium is intimately associated with carbonaceous material, most extensively with carbonaceous trash which fills voids in conglomerate and sandstone (Choate, 1962, p. 68). Directly across East Basin Creek from the pit, the mineralized, basal bed is anomalously radioactive and contains abundant marcasite filling voids in sandstone lenses. The centers of the mineralized lenses are unaltered; however, the margins have been deeply stained an intense yellow brown where marcasite has altered to limonite (Choate, 1962, p. 67).	The pit is approximately 120 ft above creek level. Maximum height of the amphitheater-shaped pit wall is 70 ft; the pit floor is 220 ft long and 180 ft wide. Because of the precarious condition of the pit wall, any further mining will have to be done by underground techniques (Choate, 1962, p. 68). Total production consisted of 1,100 tons of ore with a grade of 0.20% U_3O_8 mined by Western Fluorite and 773 tons of ore with a grade of 0.18% U_3O_8 mined by Vitro-Idaho (Choate, 1962, p. 67).	The ore bed extends down dip from the pit and drilling records indicate that at least 4,000 tons of ore are present and that the grade of the ore is about the same as that of the ore already mined (Choate, 1962, p. 67).
380	Uranus prospects (T11N, R14E, sec. 8) Silco Mining Co.	The contact between quartz monzonite and sedimentary rocks is exposed on the prospects. Exposed sedimentary rocks consist of thinly-interbedded siltstones and carbonaceous shales overlain by a bed of massive, fine-grained, arkosic sandstone. The beds have a general attitude of N90°E, 15°NW. Several high-angle faults have displaced the beds: most movement was normal. Twelve ft of vertical separation has occurred on one of the faults. Challis tuffs above the cuts have been intensely fractured and brecciated: breccia fragments have been cemented by calcite and opal. Southwest of the cuts, Challis rocks have been down faulted several hundred feet (Choate, 1962, p. 71).	Development consists of three bulldozer benches located on the north side of a draw that leads from East Basin Creek. Five churn-drill holes were sunk on the lower drilling bench by Vitro-Idaho Minerals Corp. (Choate, 1962, p. 71).	A maximum reading of 0.60 milliroentgen/hour was measured in carbonaceous beds exposed on the drilling bench (Choate, 1962, p. 71).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
381	Lucky Strike (T11N, R14E, sec. 17)	Bedded sedimentary rock, of the Challis Volcanics, overlies granitic rock. The sedimentary beds strike northwest and dip 35°-45°NE. A northwest-trending fault, with 180 ft of displacement, and associated fracture zones are exposed on the property (Choate, 1962, p. 73)	Three drilling benches and 29 churn-drill holes; the deepest hole is 155 ft deep (Choate, 1962, p. 73).	Thirteen drill holes contained anomalous radioactivity. Mineralization is restricted to sedimentary beds that range in thickness from 0.5 ft to 2.5 ft thick (Choate, 1962, p. 73). Kern (1959, p. 28) estimates the tenor of the mineralization at slightly higher than 0.20% U_3O_8. Mining of the deposit has not been attempted due to low grade of mineralization. Open pit mining would be difficult because the beds dip steeply into the hill, and serious dilution would occur with open pit or underground mining (Choate, 1962, p. 74).
382	Rocket 1-5 & Saturn (P & B) (T11N, R14E, sec. 21) Norma and William Jenkins	A large shear zone, at the intersection of four sets of closely spaced faults, is exposed in granitic rock on the prospect. A quartz latite dike and a basalt dike have been offset by the faults. Basalt near faults has been replaced by vein quartz and thin stringers of pyrite cut vein quartz and silicified basalt (Choate, 1962, p. 56). Uranium mineralization occurs in a mica schist. The schist is an inclusion of sedimentary rocks, not entirely assimilated during intrusion of the Idaho batholith (USFS, 1988).	Small prospect pits (Choate, 1962, p. 56). Five hand excavated cuts which expose the schist over a width of 50 ft and a vertical distance of 75 ft. Test trenches and sampling were undertaken through 1980 (USFS, 1988).	Maximum radioactivity, measured in gouge clay along fractures, was 2.70 milliroentgen/hour. Maximum radioactivity, measured in quartz and opal along northeast-trending fractures, was 0.13 milliroentgen/hour. A grab sample of dump material, collected by Patterson, contained 0.6% U_3O_8 (Choate, 1962, p. 56). Three samples of schist contained 0.41%, 0.05%, and 0.18% U_3O_8. No estimate of tonnage or grade (USFS, 1988).
383	Abbie Lou (T11N, R14E, sec. 21)	Country rock is highly fractured quartz monzonite. The lower portion of Basin Creek follows a fault zone that strikes N50°W. A 50 ft quartz latite dike that crossed Basin Creek has been offset right laterally for 300 ft along this fault zone. Another set of faults strike from N80°W to N80°E. Mineralization is along closely-spaced fractures that strike N80°E and dip 80°NW. The fractures contain thin pitchblende stringers, up to 1/4 in thick, and secondary uranium minerals (Choate, 1962, p. 57).	Small hand-dug pits (Choate, 1962, p. 57).	Maximum radioactivity measured was 1.70 milliroentgen/hour. Three 6-in samples, taken from along one fracture, contained 0.34% U_3O_8 (Choate, 1962, p. 57).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
384	Fool Proof (T11N, R14E, sec. 21)	Country rock is highly fractured quartz monzonite. The lower portion of Basin Creek follows a fault zone that strikes N50°W. A 50-ft quartz latite dike that crosses Basin Creek has been offset right laterally for 300 ft along this fault zone. Another set of faults strike from N80°W to N80°E. A mineralized fault zone with an attitude of N80°E, 72°SW is exposed on the claims (Choate, 1962, p. 57).	A bulldozer cut, located 100 ft above Basin Creek road was reported in 1962 (Choate, 1962, p. 57).	A sample, 3.5 ft long, taken across the fault zone, contained 0.186% U_3O_8 (Choate, 1962, p. 57). In 1956, 5 samples from 1.6 ft to 3.9 ft long, across mineralized bands contained from 0.018% to 0.084% U_3O_8 (USBM, 1988).
385	Coal Creek mine (T11N, R14E, sec. 16)	The Coal Creek group (11 claims) and the Badger claim cover the outcrop area of basal Challis sedimentary rocks along Coal Creek. Uranium mineralization occurs in the matrix of poorly cemented conglomerate or as irregular zones in arkosic sandstone, which fill old stream channels. The stream beds were cut in fractured quartz monzonite and are overlain by tufaceous sedimentary rocks or claystone. Minerals include urananite, autunite, pyrite, marcasite, realgar, and orpiment (Choate, 1962, p. 65). At the Coal Creek no. 1, the ore zone is 5 ft thick and overburden is 2 ft to 6 ft thick. The highest grade material occurs in a zone 6 in to 1 ft thick at the bottom of the channel sediments. At the Coal Creek no. 4, the mineralized zone is 120 ft long, 45 ft wide, and averages 5 ft thick. Drilling encountered mineralized beds at the Coal Creek no. 10, but the beds were not considered large enough to mine (Choate, 1962, p. 65).	Development includes an open pit on Coal Creek no. 1 roughly 310 ft long and 180 ft wide, an open pit on Coal Creek no. 4 roughly 150 ft long and 100 ft wide. Exploratory drilling has been performed on Coal Creek no. 10. Physical conditions favor open pit mining. Ore shipped consists of 1,360 tons containing 0.14% U_3O_8 from Coal Creek no. 1 and 450 tons containing 0.25% U_3O_8 from Coal creek no. 4 (Choate, 1962, p. 65).	An 11 ft channel sample of the ore zone at the Coal Creek no. 1 assayed 0.718% U_3O_8 (Kern, 1959, p. 29). Seven churn drill holes were drilled on the Coal Creek no. 10. Two holes, 15 ft apart, penetrated mineralized rocks 35 ft below the surface. The mineralized zone in one hole is 2.5 ft thick and contains 0.57% U_3O_8 and the zone in the other hole is 2 ft thick and contains 0.60% U_3O_8 (Choate, 1962, p. 67).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
386	Deer Strike mine (T11N, R14E, sec. 16)	The property is located on a down-faulted block of sedimentary rock bounded by quartz monzonite on the northeast, southeast, and southwest. Uranium mineralization is restricted to bedded sedimentary rocks, composed of intercalated beds of arkosic sandstone, arkose, and siltstone. Thickness of individual beds and lenses ranges from a fraction of an inch to several inches. The sinuous shape of the ore body indicates that it may occupy a former stream channel. Beds, exposed at the surface strike N20°-65°W and dip 20°-35°NE. The quartz monzonite-sediment contact is at N75°W, 23°NE. Carbon-rich siltstone is selectively mineralized in preference to the arkose (Choate, 1962, p. 62).	Five drilling benches and an underground mine compose the mine workings. In 1960, the underground workings consisted of a 180 ft adit, 440 ft of drifts, one stope 100 ft long and 35 ft across, and several small stopes. The property is extensively drilled. Mining commenced in 1959; total production had been 1,895 tons of ore averaging 0.23% U_3O_8 as of Dec. 1960 (Choate, 1962, p. 62).	In one stope, the ore bed ranged from 2 ft to 7 ft thick and had a grade of 0.235% U_3O_8. In another stope, the ore bed ranged from 2 ft to 8 ft thick and had a grade of 0.30% U_3O_8 (Choate, 1962, p. 63).
387	Little Joe (T11N, R14E, sec. 16)	A belt of highly fractured sedimentary rocks lies along the Coal Creek fault zone. The sedimentary rocks consist of interbedded coal, mudstone, arkosic sandstone, and conglomerate. Several small basalt dikes cut the sedimentary rocks. The fault zone strikes about N30°E and a breccia zone about 4 ft thick occurs along the fault (Choate, 1962, p. 74).	Three large pits, up to 20 ft deep, and several small cuts (Choate, 1962, p. 74).	A maximum reading of 0.16 milliroentgen/hour was obtained in one pit and a reading of 0.50 milliroentgen/hour from another pit. Four holes were drilled on the property. The average depth to quartz monzonite in two holes was 45 ft. The other two holes were 45 ft deep but did not reach quartz monzonite. Autunite was observed in fractures of freshly broken carbon-rich rock (Choate, 1962, p. 74).
388	W A J 151-154 (T12N, R14E, sec. 33) Willalijack Mining Co.	Challis Volcanics (Worl and others, 1989).	A 1980 plan of operations calls for minor blasting to further expose a vein of unknown dimensions (USFS, 1988).	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
389	Hardee (T11N, R14E, sec. 10)	Coarse-grained quartz monzonite has been intruded by numerous aplite and pegmatite dikes. Chalcedony stringers and pods occur along fractures. Quartz monzonite and chalcedony have been brecciated along a fault zone that trends N45°W (Choate, 1962, p. 52).	Several surface cuts and a 150 ft adit. Several small pods of chalcedony, which occur where stringers intersect faults or dikes. A brilliant, yellow, secondary uranium mineral coats the stringers and pods. Mining was halted because stringers are too widely spaced to compose a stockwork and too thin to mine individually (Choate, 1962, p. 52). No evidence of recent activity on field check (USBM, 1988).	Two core-drill and 30 churn-drill holes were drilled on the property. The two cores were assayed: each contained an average of 8 ft of 0.16% U_3O_8. Radiometric probing indicated that 14 holes contained ore and that one hole contained 20 ft of 0.49% U_3O_8. Chalcedony contained minute crystals of auriferous pyrite. A grab sample of mineralized rock from the adit assayed 0.18 oz/ton gold and 0.50 oz/ton silver (Choate, 1962, p. 52).
390	Alta (T11N, R14E, sec. 14)	Country rock is quartz monzonite. Seven or eight subparallel pegmatite dikes crop out on the property. The dikes are 0.5 ft to 3 ft thick, strike N70°-80°E, and dip 56°-69°SE. Quartz monzonite and dikes are cut by a set of faults that strike N45°-55°E and dip 45°-70°SE. The faults are 50 ft to 150 ft apart and displacement is from 5 ft to 30 ft right lateral. Pods, composed of chalcedony or quartz with disseminated pitchblende and minor stibnite, uranophane, and gummite occur over 400 ft along the primary fault, but are not connected over this length (Choate, 1962, p. 53).	Workings consist of an adit and raise, cuts, and several small pits (Choate, 1962, p. 53).	The pod at the discovery pit is about 13 ft long and 2 ft thick. A grab sample of chalcedony ore assayed 2.492% U_3O_8 (Kern, 1959, p. 31). Stringers of chalcedony in small pits had maximum measured radioactivity of 0.22 milliroentgen/hour (Choate, 1962, p. 53).
391	Shamrock (T11N, R14E, sec. 11)	Granitic rocks of the Idaho batholith (Worl and others, 1989).	One bulldozer pit (Choate, 1962, p. 75). No evidence of bulldozer work on field check (USBM, 1988).	Slight radioactivity reported (Choate, 1962, p. 75).
392	Lower Harden (T11N, R14E, sec. 13)	Quartz monzonite is cut by narrow reddish aplite dikes and by fractures striking N62°E, 58°NW. Uranium mineralization is evident where the fractures intersect the dikes (Kern, 1959, p. 34).	Several pits on the west side of Lower Harden Creek (Choate, 1962, p. 59).	Small pods, up to 12 in long with chalcedony, muscovite, and sericite, are radioactive up to 20 times background. (Kern, 1959, p. 34).
393	Mandate (T11N, R14E, sec. 24)	A small outlier of arkosic conglomerate overlies quartz monzonite. The sedimentary rock is brecciated and highly stained with limonite. A fault in quartz monzonite, with an attitude of N80°W, 48°NE, is exposed on the property (Choate, 1962, p75).	Several pits and a caved shaft (Choate, 1962, p. 75).	Assays found no gold or silver. A sample of breccia contains 0.06% U_3O_8 (Kern, 1959, p. 35).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
394	American Creek placer mine (T11N, R14E, sec. 24) George Smith	American Creek is a small stream with a steep gradient that flows southward into the Salmon River. Overburden along the creek is only 4 to 5 ft thick, however, it contains numerous large boulders several feet in diameter (Choate, 1962, p119).	Gravel terraces have been worked at various times by sluicing since the 1870's. Gold is found primarily in scattered pockets along bedrock. In one old working, on creek bottom, is a winze that was sunk, reportedly, on a lead-silver vein that strikes N17°W (Choate, 1962, p. 1119). An operating plan, which calls for continued small scale placering, was filed by George Smith in 1983 (USFS, 1988).	The scattered nature of gold concentrations make sampling difficult and no resources are reported.
395	Big Hank (T11N, R14E, sec. 13)	Three major rock units are exposed on the prospect. Overlying deeply weathered batholithic rock are isolated beds of arkosic conglomerate. Patches of till rest on the arkosic beds and the batholithic rock. A mineralized zone, which is 475 ft long and from 10 ft to 40 ft wide, is exposed on the Side Hill group. The zone is iron-stained granitic rock with autunite, and trends generally N60°W (Kern, 1959, p. 32). Mineralization on the Big Hank, Pine Hen, and Little Spring claims is concentrated in an outlier of arkose and arkosic sandstone, which is about 2,800 ft long and 1,800 ft wide. Some deeply weathered granitic rock beneath the margins of the arkose is also mineralized (Choate, 1962, p. 72).	Workings consist of trenches, shallow excavations, and drilling benches, where at least 53 churn-drill holes have been drilled. All drill holes were into granitic rocks, the deepest is 116 ft deep. Average depth to granitic rock was 50 ft. Pits are up to 150 ft long, 40 ft wide, and 10 ft to 12 ft thick (Choate, 1962, pp. 55,72).	In one pit on the Side Hill property, a 2 ft thick zone contained 0.23% U_3O_8. In drill holes, a zone at 6 ft deep contained 0.10% to 0.11% U_3O_8. A 100 lb sample from the pit floor contained 0.02% U_3O_8. A 35 ft channel sample cut by Kern (1959, p. 33) contained 0.05% U_3O_8. The average thickness of mineralized beds penetrated by drilling on the Big Hank, Pine Hen, Little Spring properties was 1.5 ft. The thickest bed was 5.5 ft thick; the average grade of this bed is about 0.30% U_3O_8. The average grade of thinner beds is about 0.15% U_3O_8 (Choate, 1962, p. 72).
396	Peach Creek prospects (T11N, R15E, sec. 25) Richard S. Settles	Granitic rocks of the Idaho batholith.	No data.	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
397	Elkhorn placer (T11N, R16E, sec. 30) Elmer Ogren	Perched gravels lie on granitic bedrock. High boulder content and small accumulations of gravel would make large-scale placer operation difficult. Bedrock is exposed in areas up to 20 ft by 10 ft (USBM, 1988).	Placer equipment includes a small bulldozer, grizzly, Ainlay gold separator with about a 5 yd^3/day capacity. No signs of recent activity (USBM, 1988). A 1983 plan of operations, under the name of Golden Nugget group, calls for continued placer operation with small loader and gold separator. The operator states the presence of molybdenum mineralization in a ledge west of Gardner Creek. Iron-stained quartz was observed in float but no mineralized structure was exposed. No sign of recent activity (USBM, 1988).	No data.
398	Molly Hogan group 1-22 (T11N, R15E, sec. 24) Richard S. Settles	Scheelite and molybdenite mineralization is limited to a contact zone between Paleozoic sedimentary rocks of the Wood River Formation and the Idaho batholith. Most of the mineralization resulted from deposition of high-temperature, quartz-sulfide veins along post-batholith faults. On a ridge west of Peach Creek, the mineralized body is a zoned tactite. W. Clutis reported that allanite lenses in the tactite contain niobium, tantalum, and a number of rare earth minerals including cerium (Choate, 1962, p99).	Veins and mineralized zones were exposed during road excavation up Peach Creek. No further development is reported (Choate, 1962, p. 99).	W. Cleutis reports in Choate (1962, p. 99) that a 12 ft sample across a tactite lens contained 0.71% Mo and a 20 lb grab along the lens contained 3.65% WO_3 and 3.0% Mo.
399	Annabel Lee group (T11N, R15E, sec. 10) First Eagle Corp.	Malachite and azurite occur as disseminated replacements in quartzite bordering a carbonaceous shale. Trenches expose a mineralized zone, from 1 ft to 6 ft thick, for 460 ft along strike (USBM, 1988).	A 1984 plan of operations calls for backhoe and bulldozer excavation of three trenches of 150 ft by 20 ft by 10 ft deep or to bedrock (USFS, 1988). Five trenches in 1956 (USBM, 1988).	In 1956, Defense Minerals Exploration Administration samples showed highest value of 1.0% copper and indicated no significant improvement with depth (USBM, 1988). A grab sample of quartzite from a 150 ft long open cut contained 160 ppb gold, 2.1 ppm silver, 62 ppm copper, 70 ppm lead, 28 ppm zinc (USBM, 1988). A select sample of quartzite with malachite stain contained 110 ppb gold, 9.7 ppm silver, 16200 ppm copper, 50 ppm lead, 91 ppm zinc (USBM, 1988).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
400	Billy John 1-2 (T12N, R15E, sec. 36) Willalijack Mining Co.	Tungsten mineralization at the contact of Challis Volcanics and Idaho batholith (USBM, 1988).	A 1980 plan of operations calls for cleaning out of existing pit and blasting on exposed outcrop (USFS, 1988).	No data.
401	Little Leslie 1-4 (Hygrade mine) (T11N, R15E, sec. 8) Doyle A. Coles	Mineralized float can be found throughout the talus that covers a steep slope. Three adits were driven in attempts to discover the source of the vein float. A fault zone in one adit contains quartz stringers up to 2 in thick. Dump material contains quartz and chalcedony. Vein minerals in dump include galena, pyrite, molybdenite, and an unidentified radioactive mineral in gouge (Choate, 1962, p. 93).	One caved adit about 100 ft above river level and three short adits located in a gulch half way up the mountain Choate, 1962, p. 93).	Gold and silver contained in three samples collected from the property ranged from 0.42 oz/ton gold to 0.64 oz/ton gold and 1.66 oz/ton silver to 6.96 oz/ton silver (Choate, 1962, p. 94).
402	R & R (T11N, R15E, sec. 8) L. R. Ross & Fredrick Doremus	Yankee Fork stream gravel.	A 1982 plan of operations calls for pick, shovel, and sluice box near the cabin across from pole flat campground. Ore to be taken to Blackfoot,ID for smelting (USFS, 1988). No evidence of recent activity (USBM, 1988).	No data.
403	Prospect (T11N, R15E, sec. 4)	Country rock is argillite and shale. A shear zone is N10°W, 60°NE and contains gouge, iron-stained metasedimentary breccia and carbonaceous stringers. Rocks in the zone contain disseminated pyrite and bornite (USBM, 1988).	Two adits, both caved. About 200 ton dumps at each adit.	A 5.3 ft chip sample across the east portal contained no gold, 1.6 ppm silver, 104 ppm copper, 26 ppm lead, 1500 ppm zinc, 0.002% uranium (USBM, 1988). A random chip sample across the portal of the west adit contained no gold, 1.8 ppm silver, 162 ppm copper, 68 ppm lead, 860 pm zinc, 0.003% uranium (USBM, 1988).
404	Princess & Perry's Pkg. (T11N, R15E, sec. 5) Arleen Perry	An area of altered quartzite within granodiorite of the Idaho batholith. A grey-black gouge zone with an apparent strike of N32°W and dipping 82°NE is exposed in a road cut near the mouth of Rankin Creek (USFS, 1988).	Shallow excavation along a road cut (USFS, 1983). A 1986 plan of operations calls for the development of an adit and sampling. (USFS, 1986)	No data.
405	Charlotte Gay placer (T12N, R15E, sec. 32) Wayne Willard, WM. G. Moore	Isolated outcrops of Idaho batholith covered by alluvium in a flat meadow on the west side of Yankee Fork Valley. (USFS, 1988).	Several small backhoe pits and several buildings (USFS, 1988).	Four samples, consisting of 1 pan, 1 ft^3, 1 ft^3, and 2 ft^3, were taken from material in test pits in 1972 by a USFS examiner. Average grade of the four samples was \$0.663/yd^3 (USFS, 1988).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
406	Ramey Creek group (Only Chance) (T12N, R15E, sec. 32) Bob Taylor, Don Beamis	Yankee Fork stream gravels.	A 1982 plan of operations calls for test holes (USFS, 1988). A 1984 plan of operations calls for additional testing. (USFS, 1988).	No data.
407	Gold Star 1-4 (T11N, R15E, sec. 5) Brigham Young Univ.	Rocks present on the prospect are granite of the Idaho batholith, Paleozoic limestone, and alluvium. Placer gravel is present along the canyon bottom of Rankin Creek (USFS, 1988).	Tailings from previous placer operations along Yankee Fork are evident on lower Rankin Creek. Placer gravels, up to 7 ft thick remain along Rankin Creek (USFS, 1988).	Two samples were taken in 1973 by USFS examiners; a one ft^3 sample from water level to bedrock, and a one ft^3 sample from water level 7 ft up to the surface of the gravel. Results indicate the gravels have a value of \$0.1397/yd^3 (USFS, 1988).
408	Little Nugget No. 1 (T11N, R15E, sec. 6) Chuck Chesney	Stream gravels of Rankin Creek. Depth to bedrock is unknown, but estimated at 30 ft (USFS, 1988).	Limited prospecting to a maximum depth of 10 ft (USFS, 1988).	Values of up to \$0.05/yd^3. History of past mining on Rankin Creek below this property showed marginal recoverable values. (USFS, 1988).
409	Sunrise (T11N, R15E, sec. 6)	Narrow gold-silver veins have been explored at several places in the drainage of Rankin Creek (Choate, 1962, p. 97).	Shallow prospect pits. No evidence of recent activity.	No data.
410	Lucky Shelly Kay (T11N, R15E, sec. 6) August Martsch	Iron-stained and altered medium-grained granite. Iron-stained fractures strike N60°E, and dip 60°NW in an open cut. The operators indicate a mineralized zone that is 700 ft long and from 120 to 160 ft wide containing gold and silver. (USBM, 1988)	Surface exploration trenches and pits. Operators excavated about 480 tons of rock from the proposed open pit for testing in 1988. The rock was processed and concentrated on site (Robert Baird, personal commun., 1988).	The operator indicated a grade of 0.1 oz/ton gold from samples within the zone (Robert Baird, personal commun., 1988). A select sample of iron stained and fractured granitic rock from a 5 ft deep, 150 ft long trench contained 5 ppb gold, 0.1 ppm silver, 15 ppm copper, 56 ppm lead, 50 ppm zinc (USBM, 1988).
411	Sunset mine (T11N, R15E, sec. 6)	Narrow gold-silver quartz veins occur along a series of closely spaced, hematite-stained fractures in non-porphyritic granitic rock. Rock near the fractures has been moderately silicified and sericitized (Choate, 1962, p. 97).	One adit with a caved portal (Choate, 1962, p. 97). Production of gold and silver from 1939 to 1941 (USBM, 1988).	No data.
412	Rankin Creek mine (T12N, R15E, sec. 31)	Highly limonite-stained rock cut by quartz stringers (Choate, 1962, p. 97).	One adit (Choate, 1962, p. 97). Production of 4 oz gold, 71 oz silver, and 1,707 lb lead (Fisher and Johnson, 1987, p. 103).	One grab sample of limonite-stained rock cut by quartz stringers from the dump contained 0.54 oz/ton gold and 6.96 oz/ton silver (Choate, 1962, p. 97).
413	Lucky Shelly (T12N, R15E, sec. 31) Clifford and Otis Sanders	Stream gravels on Rankin Creek (USFS, 1988).	A 1984 plan of operations calls for a 3-in suction dredge in the stream channel (USFS, 1988).	No data.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
414	Ace in the Hole (T12N, R15E, sec. 31) August Martsch	Narrow, gold-silver quartz veins in granitic rock (Choate, 1962, p. 97).	A series of bulldozer cuts in granitic rock on the ridge north of Rankin Creek (Choate, 1962, p. 97).	Altered and iron-stained granitic rock from the face of an open cut where the most highly altered rocks were exposed contained 280 ppb gold, 0.1 ppm silver, 93 ppm copper, 16 ppm lead, 15 ppm zinc (USBM, 1988).
415	Rose group (T12N, R15E, sec. 31) Golden Dream Mining Co.	Granitic rocks of the Idaho batholith (Worl and others, 1989).	A 1986 plan of operations indicates a bulldozer trench will expose 100 ft of a quartz vein for sampling (USFS, 1988).	No data.
416	Ramey Creek project (T12N, R15E, sec. 22) Nevada Resources	The area is underlain by various Paleozoic sediments cut by acid to intermediate dikes. Tertiary lava flows cover portions of the area. Geochemical anomalies indicate possible molybdenum-copper mineralization. Disseminated pyrite occurs within the sediments. (USFS, 1988).	Work on the property has consisted of detailed soil geochemical surveys, geological mapping, color air photography, reconnaissance magnetometer traverses, induced polarization survey and the drilling of one diamond drill hole to a depth of 820 ft (USFS, 1988).	Nevada Resources reports soil and rock geochemistry samples with values up to 2,600 ppm copper and 70 ppm molybdenum (USFS, 1988).
417	Bachelor Mountain mine (Gray Eagle) (T12N, R15E, sec. 13) Monroe & Wells Inc.	Several quartz veins that strike generally N50°-70°W, from 2 to 8 ft wide and no more than a few hundred feet long. Exposed veins are in andesite flows a short distance above dacite porphyry. Vein minerals include pyrite, sphalerite, chalcopyrite, galena, and gold (Anderson, 1949, p. 28).	A dozen or more adits and several shallow cuts. The property was active intermittently from 1917 to 1938 (Anderson, 1949, p. 28). Production of $12,000 to $20,000 in gold and silver is reported for the years 1935 to 1963 (USBM, 1988). A haul road now connects this property to the General Custer-Lucky Boy haul road and provides haulage to the Preachers Cove Mill. Underground workings and access are being improved (USBM, 1988).	Two samples contained traces of gold and silver (USBM, 1988). A select sample from a small stockpile containing dark blue silicified rhyolite with disseminated pyrite and kaolinized gouge. The sample contained 1,400 ppb gold, 20 ppm silver, 33 ppm copper, 320 ppm lead, 345 ppm zinc, and no uranium (USBM, 1988). A select sample of silicified and kaolinized rhyolite with sooty limonite in fractures and vugs from dumps contained 880 ppb gold, 10 ppm silver, 92 ppm copper, 800 ppm lead, 190 ppm zinc, and no uranium (USBM, 1988).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
418	Yankee Fork Mill (T12N, R15E, sec. 20) John Lawrence	The silicious ores which make up the bulk of the mill feed come from the General Custer Mine area, Estes Mountain properties, the Yellow Jacket Mine, and the Valley Creek property. Ores from the Black mine, the Lost Packer Mine, the Atlantis Mine and other areas in Idaho, Oregon, and Montana are also being custom milled (USFS, 1988).	"The Yankee Fork Mill utilizes a flotation - gravity circuit to concentrate a variety of ores; including a number that are treated on a custom basis. Most of the concentrates are leached on-site for gold and silver recovery using a batch, agitated leach circuit followed by Merrill-Crowe precipitation and crucible reduction. The mill and leach circuit have been operating for the past eight years and have been operating year round, 24 hours a day, seven days a week for the past three years (USFS,1988).	No data.
419	Yankee Fork placer mine (T12N, R15E, sec. 20)	Dredged ground is 5.25 mi long and averages 400 ft wide along Yankee Fork. The pay streak is reported to be about 6 in above bedrock, 8-10 in thick, and 150 ft wide. Downstream from Rankin Creek, the pay streak was too deep to be reached, but upper gravels contained "paying quantities", upstream from Rankin Creek the upper gravels were practically barren (Choate, 1962, p. 106).	A 650-ton, 8-ft^3, Bucyrus-Erie dredge with a maximum depth of 30 ft worked the gravels from 1940 to 1952. Total production of 29,180 oz gold and 16,891 oz silver is reported (Choate, 1962, p. 107).	Drilling indicated that Yankee Fork, above Jordan Creek, contained $\$0.16/\text{yd}^3$ gold, whereas Jordan creek contained $\$1.00/\text{yd}^3$ to $\$3.00/\text{yd}^3$ (Choate, 1962, p. 108).
420	Hygrade 1-3 & Windfall 1-4 (T12N, R15E, sec. 20) Robert E. Wood	Placer gravel along Yankee Fork (USFS, 1988).	No evidence of recent activity (USBM, 1988).	No data.
421	Sandy J group (T12N, R15E, sec. 17) Guy Hughes	Stream gravels and dredge tailings in Yankee Fork stream channel (USFS, 1988).	Since 1982, exploration trenches and pits have been dug to evaluate placer ground. A vein is reported to zig-zag up a ridge where small hand-dug trenches expose it. A 1987 plan of operations calls for open pit placer operation by John Lawrence (USFS, 1988).	Three samples, taken in virgin gravel by USFS examiners, contained gold values of 2.79, 5.76, and 4.68 cents/yd^3. Examiners indicated that the gravels would have been dredged by Baumhoff at the time he dredged Yankee Fork if there had been sufficient values (USFS 1988).
422	Gold Lode 6-10 & Jesse Cloud placer (T12N, R15E, sec. 18) Robert Markley	Challis Volcanics and alluvium.	A 1980 plan of operations calls for road building and provisions for development of two dump (USFS, 1988).	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
423	Helen's Mine placer (T12N, R15E, sec. 17) Helen F. Nordling	Gravel bar (USFS, 1988).	A 1986 plan of operations calls for enlarging a test pit (USFS, 1988).	No data.
424	Red Rock ("Unknown") (T12N, R15E, sec. 8) Cathrine Brown	The property is along the same general zone of shearing or fissures as the Charles Dickens and Morrison mines. Two veins, about 30 ft apart, strike about N80°E and dip 70°NW. They are less than 2 ft wide and consist of quartz in fractured volcanics (Anderson, 1949, p. 35).	Cuts and pits (Anderson, 1949, p. 35). An adit is to be maintained and a rocker will be used according to a 1973 plan of operations (USFS, 1988).	No data.
425	Gold Lode 1-5 (T12N, R15E, sec. 7) Robert Barrett	Highly fractured, bleached, and iron-stained Challis Volcanics. Altered rhyolite contains up to 60% kaolinite and petrified wood in small amounts (USBM, 1988).	In a 1987 letter, the operators describe provisions for hauling 200 tons of ore from the Bearclaw property to their mill on Yankee Fork. The mill will consist of a cement mixer and ponds to be used as a "wash plant" (USFS, 1988). In 1988, development was suspended by a USFS injunction and the newly started portal was caved (USBM, 1988).	A random chip sample across 50 ft of exposed volcanics in the open cut above the caved portal. The sample contained no gold, 60 ppm silver, 18 ppm copper, 18 ppm lead, 60 ppm zinc and no tungsten (USBM, 1988).
426	Fairplay mine (T12N, R15E, sec. 8) John Lawrence	Challis volcanics (Worl and others, 1989).	Production of $20,000 to $25,000 (Umpleby, 1913c, p. 87). Production of gold and silver from 1953 to 1954 (USBM, 1988).	A grab sample of limonite-stained andesite with disseminated pyrite from a dump contained 180 ppb gold, 15.6 ppm silver, 91 ppm copper, 48 ppm lead, 98 ppm zinc (USBM, 1988). A 1.2 ft chip sample of vuggy quartz-calcite vein in andesite with pyrite contained 650 ppb gold, 100 ppm silver, 187 ppm copper, 114 ppm lead, 87 ppm zinc (USBM, 1988).
427	George Washington mine (Morrison) (T12N, R15E, sec. 8)	The George Washington (Morrison) property is across Jordan Creek from the Charles Dickens mine and is thought to be a continuation of the same vein. Two veins are contained in andesite country rock and strike about N70°E. The veins are primarily quartz and contain pyrite, chalcopyrite, malachite, and azurite. The south vein is about 2 ft wide and is exposed in cuts for 500 ft, and the north vein is 10 in thick where exposed at a caved portal (Anderson, 1949, p. 35).	All underground workings are caved, except for some open cuts. Production is reported at about $100,000 (Umpleby, 1913c, p. 87).	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
428	Passover (Last Chance) mine (T12N, R15E, sec. 8) Hugh Johnson	Tuff nodules and tuff lenses in altered and silicified rhyolite. Tuff has largely altered to clay and has iron- and manganese-oxide stain. The silicified rhyolite contains quartz veinlets and disseminated pyrite (USBM, 1988).	The operator has advanced and timbered about 100 ft of adit and had begun a second portal designed to connect to the first adit. The operation is a one man effort (USBM, 1988). The current operator, Hugh Johnson, has filed plans of operations under the name of the Last Chance Group. Production of $20,000 to $25,000 was reported from underground workings in this area, just south of the Morrison mine, in the early 1900's under the name of Passover (Umpleby, 1913c, p. 87).	A select sample from a stockpile contained trace gold, 0.7 oz/ton silver, no tin and no WO_3 (USFS, 1988). A random chip sample across 12 ft of silicified andesite and tuff in the face of the south adit contained 35 ppb gold, 3.5 ppm silver, 43 ppm copper, 50 ppm lead, 88 ppm zinc (USBM, 1988). A 6 ft chip sample across a fractured quartz vein in andesite with disseminated pyrite contained 125 ppb gold, 46 ppm silver, 48 ppm copper, 140 ppm lead, 133 ppm zinc (USBM, 1988). A 1.5 ft chip sample across a gouge zone in the foot wall beneath the quartz vein contained 15 ppb gold, 3.2 ppm silver, 34 ppm copper, 36 ppm lead, 225 ppm zinc (USBM, 1988).
429	Holiday (T12N, R15E, sec. 5) George Castle	Alluvium along Jordan Creek.	Area tested for bench placer (USFS, 1988).	No data.
430	Runover mine (T12N, R15E, sec. 8) John Lawrence	The Runover is situated nearly at the mouth of Jordan Creek, and is about on the strike of the Charles Dickens mine. It carries a small talcy vein in porphyry up to 2 ft wide (Bell, 1908, p. 77).	One of several properties in the Charles Dickens area operated by U.S. Antimony Corp. (USFS, 1988). Production of gold and silver from 1908 to 1911 (USBM, 1988).	The vein contains average values of 5 to 15 oz/ton gold and produced specimen ore in chunks as large as walnuts that are 50% gold (Bell, 1908, p. 77).
431	Bonanza occurrence (T12N, R15E, sec. 9) John Lawrence	A quartz vein, which strikes N70°E and dips 30°NW, is 12 to 18 in thick. The vein contains scattered pyrite, chalcopyrite, and galena (Anderson, 1949, p35)	In 1947, work consisted of 700 ft of underground development in four adits, spaced along a ridge several hundred yd south of the Charles Dickens mine. The property was active around 1922, but no production is reported (Anderson, 1949, p35). One of several properties in the Charles Dickens area operated by U.S. Antimony Corp. (USFS, 1988).	A select sample of silicified, pyritic tuff from a stockpile at a loading dock near a locked adit contained 30 ppb gold, 17.8 ppm silver, 1,000 ppm copper, 820 ppm lead, 1,050 ppm zinc (USBM, 1988).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
432	Julietta mine (T12N, R15E, sec. 8)	Challis volcanics near the Charles Dickens mine, north of the Fairplay and Passover (Umpleby, 1913c, p. 87).	Production of a few thousand dollars prior to 1913 (Umpleby, 1913c, p. 87). Production of gold and silver in 1907 (USBM, 1988). A 700 ft adit with a stope of approximately 200 tons and an inclined raise to the surface (USBM, 1988).	A random chip across 4 ft of kaolinized shear in rhyolite at the face of the adit contained no gold, 1.3 ppm silver, 455 ppm copper, 40 ppm lead, 250 ppm zinc (USBM, 1988). A grab sample of bleached tuff with quartz stringers up to 1 in thick contained 75 ppb gold, 0.6 ppm silver, no copper, 20 ppm lead, 25 ppm zinc (USBM, 1988). A grab sample of vuggy quartz vein material with pyrite in andesite from the dump at a caved shaft contained 1,400 ppb gold, 172 ppm silver, 34 ppm copper, 332 ppm lead, 219 ppm zinc (USBM, 1988).
433	Buckshot No. 1 (T12N, R15E, sec. 8) David Church	Placer gravel of Jordan Creek (USFS, 1988).	A 1988 plan of operations calls for the excavation of an exploration pit 40 ft wide by 100 ft long, which is expected to reach bedrock at about 15 ft (USFS, 1988). A 120 ft adit on the east side of the road along Jordan Creek.	A 1.5 ft chip sample across sheared rhyolite with quartz stringers in the adit contained 20 ppb gold, 1.1 ppm silver, 116 ppm copper, 20 ppm lead, 71 ppm zinc (USBM, 1988).
434	Letha mine (T12N, R15E, sec. 8)	Challis volcanics near the Charles Dickens mine, north of the Fairplay and Passover (Umpleby, 1913c, p. 87).	Production is reported to be $60,000 (Umpleby, 1913c, p. 87). Production of gold and silver in 1902 (USBM, 1988).	No data.
435	Charles Dickens mine (T12N, R15E, sec. 8) John Lawrence	The vein, which strikes N70°E and dips 70°NW, is a fissure filling ranging from 2 to 6 ft wide. It is enclosed in tuff in the upper portion and in andesite in the lower workings. The gangue is fine-grained quartz. Associated with it are galena, chalcopyrite, and in the oxidized ore are gold, silver, cerargyrite, and argentite (Umpleby, 1913c, p. 87).	Development consists of an adit and a winze from it, the total depth is about 250 ft. The property produced about $600,000 from 1889 to 1902 (Umpleby, 1913c, p. 87). One of several properties in this area operated by U.S. Antimony Corp. (USFS, 1988). Production of gold, silver and copper from 1960 to 1968. (USBM, 1988)	A random chip across 12 ft in the face of a trench. Altered rhyolite with silicified veinlets and fracture filings, iron stain and minor pyrite. Sample contained 25 ppb gold, 4.8 ppm silver, 16 ppm copper, 26 ppm lead, 31 ppm zinc and no tungsten (USBM, 1988).
436	Trapper (T12N, R15E, sec. 3) Carlyle Castle	Shear zone at least 2 ft wide in argillic altered rhyolite. A breccia vein at last two in wide has pyrite veinlets and pyrite bearing clasts. The vein was not seen in place. A mafic dike cuts the shear zone at the north end of the workings (USBM, 1988).	An 50 ft long open bulldozer cut with a 12 ft high bank (USBM, 1988).	A select sample of silicified breccia float containing disseminated sulfides and pyrite casts contained 555 ppb gold, 2.5 ppm silver, 8 ppm copper, 22 ppm lead, 14 ppm zinc (USBM, 1988).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
437	Honey Girl (T12N, R15E, sec. 8) Harry Lau, John McHenry	Stream channel of Yankee Fork (USFS, 1988).	Operators report modest gold recovery from a 3-in suction dredge (USFS, 1988).	No data.
438	Dubuque mine (T12N, R15E, sec. 3) Arthur W. McGowan	Placer gravel on Yankee Fork. Metasedimentary rocks are exposed between Challis Volcanics at higher elevations and Idaho batholith granitics at lower elevations. The General Custer mineralized zone has been faulted and broken accounting for the area having scattered high grade ore (USFS, 1988).	Surface ore was stripped as early as 1880. In the 1930's, testing of the Yankee Fork channel indicated good gold values in a channel too narrow to allow dredging. 5.5 tons of ore shipped in 1956 contained $56.38/ton gold. Mercury and amalgam from creek gravels below the General Custer mill have been recovered (USFS, 1988).	No data.
439	Longview mine (T12N, R15E, sec. 10)	The property is along a broad zone of fracturing in sericitized andesite with some pyrite. Mineralization is confined to a prominent fissure which strikes N77°W and dips 70°NE in the lower workings and curves to strike N77°E and dip 74°NW in the upper adit. The zone is filled with breccia of altered andesite and quartz fragments in a quartz matrix. Silver and gold minerals are present in the quartz veins with associated calcite and barite (Anderson, 1949, p. 27).	One abandoned shaft and cut on the crest of the ridge, a caved adit on the south side, and two open adits on the north side of the ridge. The upper adit on the north connects with the shaft. Ore of unknown quantity is reported to have been mined in the early days (Anderson, 1949, p. 27). Production of gold in 1946 (USBM, 1988).	No data.
440	Idaho (T12N, R15E, sec. 10) Lucky Custer Gold Inc.	A zone from 25 to 30 ft wide, is brecciated and cemented with quartz. A quartz vein within the zone strikes N70°E, dips 65°NW, and is up to 2 ft thick. The zone, however is traceable for about 2,000 ft easterly from the General Custer. The vein carries pyrite, arsenopyrite, enargite, pyrargyrite, gold (electrum), and tetrahedrite (Anderson, 1949, p. 27).	Development consists of an 850 ft cross-cut with a 25 ft drift, and a number of short adits and cuts. All workings are caved, except some cuts and a large glory hole (Anderson, 1949, p. 27). One of several properties in the General Custer-Lucky Boy area now operated by Lucky Custer Gold Inc. (Lucky Custer Gold Inc., 1987).	No data.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
441	General Custer mine (T12N, R15E, sec. 10) Lucky Custer Gold Inc.	The General Custer vein is a fissure filling which strikes N60°W and dips 35°NE. It varies from a few in to 18 ft wide and averages about 6 ft. The ore shoot had a strike length of 500 ft and was mined from 8,400 to 8,000 ft elevation. The upper portion of the vein is in altered and silicified andesite and the lower portion is in bedded tuff. As the vein entered the tuff, the ore grade decreased. The vein filling was mainly quartz with some calcite, with pyrite, tetrahedrite, argentite, and chalcopyrite. Erosion had removed the hanging wall from the vein and the ore lay against the side of a narrow gulch. All that was necessary to mine the ore was break the ore from the side of the gulch (Umpleby, 1913c, p. 84).	From 1876 to 1905, production was about $8,000,000. Early shipments contained as much as $900/ton in silver and gold, and averaged $150 to $300/ton. Later, production fell to around $30/ton. The ore is reported to have contained 80 to 90 oz silver to each oz of gold (Anderson, 1949, p. 22). Lucky Custer Gold Inc. now operates several properties in the General Custer-Lucky Boy area (Lucky Custer Gold Inc., 1987). In 1986, Lucky Custer Gold leased operation to Excel Minerals. In 1987, Excel leased to John Lawrence (Lawrence, John, personal commun., 1988).	No data.
442	Mullan (T12N, R15E, sec. 15)	A zone consisting of breccia of silicified andesite and quartz, from a few feet to 40 ft wide, is traceable for 2,500 ft southeasterly from the southeast end of the General Custer property (Anderson, 1949, p. 24).	Several short adits on the west end of the property, a shaft, some cuts, and a 550 ft crosscut on the east end. No production is reported (Anderson, 1949, p. 24).	No data.
443	Vishneu (T12N, R15E, sec. 10) Lucky Custer Gold Inc.	A zone of fractures which strikes N60°E and dips 70°-85°NW. The zone is traceable on the surface for 1,500 ft along a trend of N70°E. Ore was reported to be in small pockets along quartz veins in the zone (Anderson, 1949, p. 24).	Two adits and an old shaft. The upper adit is 95 ft long, the other is more than 250 ft long (Anderson, 1949, p. 24). One of several properties in the General Custer-Lucky Boy area operated by Lucky Custer Gold Inc. (Lucky Custer Gold Inc., 1987)	No data.
444	Combination (T12N, R15E, sec. 15)	Adjoining the Golden Sunbeam, the Combination Mining Co. claims cover part of the area of Bismark Mtn, carrying similar deposits of gold-bearing andesite and rhyolite tuff. Pockets of very rich native gold and silver ore are also present (Bell, 1908, p. 75).	Now part of the Sunbeam mine.	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
445	South Sunbeam (T12N, R15E, sec. 15)	Adjoining the (Golden) Sunbeam mine, the North and South Sunbeam claims cover part of the area of Bismark Mtn, carrying similar deposits of gold-bearing andesite and rhyolite tuff, and pockets of very rich gold and silver ore (Bell, 1908, p. 75).	Now part of the Sunbeam mine.	No data.
446	Enterprise group (T12N, R15E, sec. 15)	Rocks in the area are altered andesite of the Challis Volcanics. Three ledges have been recognized on this property. The largest vein strikes N75°E and dips 65°NW. It consists of a brecciated zone 25ft to 30 ft wide, cemented with quartz. Gold is probably contained in blue-black bands in the quartz. (Umpleby, 1913c, p. 86)	Development consists of a tunnel 850 ft long and a few open cuts. (Umpleby, 1913c, p. 86)	Metallization is most intense near the hanging wall, where a cross section of 10 ft had returns of $10/ton in gold and traces of silver. Laterally or vertically, the lode has not been explored more than a few feet from the adit (Umpleby, 1913c, p. 86).
447	McClure (T12N, R15E, sec. 14)	Two mineralized faults in altered andesite; one strikes N80°E, dips 65°NW, and the other strikes N74°E, dips 60°NW, composed of fractured andesite, quartz, and gouge. To the south of these faults is a zone of fractures with quartz stringers which trends about N25°E (Anderson, 1949, p. 27).	Six adits, one 300 ft, another 185 ft , and four of unknown length. In the silicified zone to the south is a large cut and a short adit (Anderson, 1949, p. 27).	No data.
448	Continental (T12N, R15E, sec. 14) Lucky Custer Gold Inc.	A vein, which strikes N60°W and dips 60°NE, swells into a chimney like mass of silicified rock about 100 ft across. The silicified rock contains sphalerite, tetrahedrite, pyrite, galena, chalcopyrite, pyrargyrite, argentite, electrum, and gold (Anderson, 1949, p. 26).	All but the highest of the five adits are caved. The one that is open is about 200 ft long (Anderson, 1949, p. 26). One of several properties in the General Custer-Lucky Boy area now operated by Lucky Custer Gold Inc. (Lucky Custer Gold Inc., 1987).	No data.
449	Badger mine (T12N, R15E, sec. 15)	A vein, from 2 to 12 ft wide, parallels the Lucky Boy mineralized zone to the east. The quartz-calcite vein carries pyrargyrite, tetrahedrite, argentite, galena, sphalerite, and gold (Anderson, 1949, p. 24).	Two adits and a shaft, all caved with little evidence of their location. Total development or production is not reported (Anderson, 1949, p. 24). Production of gold and silver in 1902. (USBM, 1988).	No data.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
450	Lucky Boy mine (T12N, R15E, sec. 15) Lucky Custer Gold Inc.	The Lucky Boy area consists of a series of fault fissures in altered volcanic intrusives and extrusives. The fissures are filled with quartz and increasing calcite with depth. The altered zone is 300 to 600 ft wide and extends for at least 1,200 ft. Parallel veins in the fissure zone contain pyrite, chalcopyrite, sphalerite, galena and tetrahedrite. The primary values are gold and silver (Lucky Custer Gold Inc., 1987; Anderson, 1949, p. 23).	More than 10,000 ft of underground workings are developed on the Lucky Boy and parallel veins to a depth of 500 ft. The property has been under lease by Excel Minerals Co. from the owner, Lucky Custer Gold Inc., since 1981. Surface mining and extensive exploration and sampling has continued up to 1986. The primary product is gold (Anderson, 1949, p. 22; Lucky Custer Gold Inc., 1987). From 1939 to 1942, production is reported at 10,000 oz gold and 142,000 oz silver. Production up to 1947 is valued at $2,200,000 (Anderson, 1949, p. 22).	From 1981 to 1985, Excel Mineral Co. drilled 41 rotary holes totaling 4,186 ft, 73 reverse-circulation holes totaling 13,438 ft, and 53 core holes totaling 6,563 ft on the combined Lucky Boy-General Custer properties. Reserves on the combined properties are 1,210,328 tons of ore at an average of 0.063 oz/ton gold and 0.403 oz/ton silver (Lucky Custer Gold Inc., 1987).
451	Yellow Bird (T12N, R15E, sec. 14)	Two veins are about 500 ft apart on the ridge between Fourth of July and Adair Creeks. Both veins strike about N70°E and dip 60°NW. The veins are from a few inches to 6 ft thick and can be traced for several hundred feet. The veins are primarily quartz with calcite, pyrite, and argentite (Anderson, 1949, p. 25).	The workings on the Adair Creek side include three adits, one is 75 ft long. The other workings are caved but the stopes have collapsed to form a long cut. No production reported (Anderson, 1949, p. 25).	No data.
452	Black mine (T12N, R15E, sec. 14) R. M. Barrett	On both sides of the ridge between Adair and Fourth of July Creeks. Two parallel veins, the one on the west side of the ridge strikes N50°-55°W and dips 65°NE. The vein has been explored underground for about 2,000 ft, and is mainly breccia veinlets of quartz and calcite (Anderson, 1949, p. 25).	The mine operated intermittently from the 1800's to 1942, with a 20- stamp mill on the property by 1907. There were six adits with more than 7,000 ft of underground workings which are now caved. Oxidized ore shoots are reported to have contained $10 to $30/ton in gold and silver (Bell, 1908, p. 76).	No data.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
453	Fourth of July mine (T12N, R15E, sec. 14)	Two veins overlap within a 40 ft wide zone of fractured and silicified argillite, which trends N70°E. The east vein is 3 to 4 ft thick, the west vein averages 14 to 18 in thick. The filling in both veins is primarily quartz, with calcite, pyrite, galena, sphalerite and argentite (Anderson, 1949, p. 26).	Development consists of 7 adits, 5 on the east side of the ridge, and 2 on the west. On the Fourth of July Creek side, adits are 270, 98, 75, and 30 ft long. On the other side of the ridge, the lower adit is 115 ft long (Anderson, 1949, p. 25). In the late 1930's there were small shipments of rich ore; one shipment of 20 tons, in 1942, averaged 9 oz/ton gold (Anderson, 1949, p. 25). The Fourth of July claims and millsites have been consolidated with six other patented and unpatented properties in the immediate vicinity by Pangea Mining Co. Pangea has filed plans of operations and intends to undertake underground development and testing. Development rock is to be shipped to Nevada for testing. Development and haulage are to proceed in 1989 on a seasonal basis (Bill Redhead, Pangea Mining Co., personal commun., 1988).	Samples of ore have contained as high as 8.3% lead, 4.3% zinc, 2.35 oz/ton silver and no more than a trace of gold (USBM, 1988).
454	Wire Silver (T12N, R15E, sec. 22)	A quartz vein, about 4 ft wide, strikes N70°E and dips 80°NW for about 150 ft in a zone of sericitized and silicified andesite . The vein contains pyrargyrite and pyrite (Anderson, 1949, p. 26).	Surface cuts and a shallow adit with a stope to the surface (Anderson, 1949, p. 26).	No data.
455	King Solomon 1-4 (T12N, R15E, sec. 14) Doug Hammond	Silicified shear zone in Challis Volcanics. Sooty limonite and kaolinized rhyolite on dumps. Silicified rhyolite with disseminated pyrite and barite and calcite veinlets also on dumps. Azurite and malachite coating on fractures of silicified volcanics.	About 250 ft of underground workings (Campbell, 1924, p. 93). Two portals which are about 50 ft apart have been started. Work continues to develop one of the portals and set timber. The new activity is about 100 ft above a caved portal (USBM, 1988).	A select sample of silicified rhyolite with disseminated pyrite from a 200 lb stockpile contained 1,000 ppb gold, 1.31 oz/ton silver, 3,400 ppm copper, 2.17% lead, 3.45% zinc, no uranium (USBM, 1988). A select sample of sooty limonite gossan in kaolinized rhyolite from 200 lb stockpile contained 1,420 ppb gold, 22.75 oz/ton silver, 5,300 ppm copper, 3.73% lead, 3,100 ppm zinc (USBM,1988).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
456	High Hopes (T12N, R15E, sec. 9) Raymond Adams	Stream gravel (USFS, 1988).	A 1981 plan of operations filed (USFS, 1988).	No data.
457	Shoestring (Crazy Lumberjack) (T12N, R15E, sec. 9) William Stricklan, Guy Hughes	Stream gravels along Adair Creek (USFS, 1988).	Gravels have been worked by backhoe, truck, and processed on site from about 1972 to 1987. No production reported. (USFS, 1988).	Sampling by USFS officials in 1973 contained \$3.30/yd^3 gold in one sample and \$0.72/yd^3 gold in a second sample for a weighted average of \$1.04/yd^3 gold (USFS, 1988).
458	Olga Marie (Moonbeam) (T12N, R15E, sec. 8) E. D. Moon	The stream bed in this area of Jordan Creek consists of placer gravels upstream from dredge tailings. Churn drill holes on nearby claims indicate bedrock to be 25 to 30 ft below ground surface. (USFS, 1988).	This area was previously worked by a bucket line dredge. The current operation proposes to recover free gold by sluicing, with settling ponds and recirculated water. A 1986 plan of operations indicates an intended production rate of 500 yd^3/day and 100,000 yd^3/year. The current operator expressed intentions to mine approximately 2.5 mi of Jordan Creek over a 10 year period. (USFS, 1988). Testing with a 25 yd^3/hour maximum capacity trommel and track mounted excavator began in 1988. Results of 1988 tests were encouraging and continued operations are planned. (USBM, 1988)	Coarse to fine (up to 3/8 in), bright and angular gold was recovered during testing (USBM, 1988).
459	New Deal & Square Deal (T13N, R15E, sec. 29) E.D.Moon	Placer gravels which vary in thickness (up to 20 ft), are perched above the present stream channel. The deepest accumulation of gravels is in an old stream channel with N40°E trend (USFS, 1988).	A 200 by 240 ft pit exposes gravels in the old stream channel. Ditches and settling ponds support placer activity (USFS, 1988). In 1988, the owners conducted pilot tests of placer gravels on the property. About 50 yd^3/day were processed using a track mounted excavator and a portable wash plant. Results after several days of operation were encouraging. The equipment was moved south about 1 mi to the Olga Marie (Moonbeam) claims to test gravel at that location.	In Sept., 1981, the claims were sampled as part of a patent examination. USFS samples indicate 26,819 yd^3 of gravel with an average value of \$20.68/yd^3 at \$426.81/oz gold price (USFS, 1988).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
460	Tammco group (T13N, R15E, sec. 29) Brad Tate	Challis Volcanics (USBM, 1988).	No evidence of recent activity (USBM, 1988).	No data.
461	Silver Pine & Soapstone (T13N, R15E, sec. 30) Carlyle Castle	A shear zone in rhyolite tuff contains carbonaceous mudstone, kaolinized rhyolite breccia and disseminated pyrite (USBM, 1988).	One adit is driven along a shear zone which trends N10°E (USBM, 1988).	An 8 ft chip sample of kaolinized rhyolite above the portal of an adit contained 205 ppb gold, 12.4 ppm silver, 7 ppm copper, 16 ppm lead, 16 ppm zinc (USBM, 1988).
462	Prospect (T13N, R15E, sec. 29)	Fractured rhyolite bedrock along Montana Gulch.	Small scale placer activity along Montana Gulch. No evidence of underground development.	No data.
463	Nugget group (T13N, R15E, sec. 29) L. L. Anderson	Gold accumulated on short step-like flats along the very steep and narrow walls of Montana Gulch. The gold is on bedrock, beneath several feet of overburden (Choate, 1962, p. 105).	In 1960, the gulch was being placered by L.L. Anderson and activity continued at least through 1979. Montana Gulch is reported to have yielded nuggets up to 1 in. in diameter (Choate, 1962, p. 105). A 1986 plan of operations calls for placer operation with material being hauled to an on site wash plant (USFS, 1988).	No data.
464	Payoff group (T13N, R15E, sec. 29) L.L. Anderson	Stream gravels in Montana Gulch (USFS, 1988).	A 1984 plan of operations calls for skimming overburden from placer and lode sites (USFS, 1988).	No data.
465	Montana Gulch placer (T13N, R15E, sec. 28) George Castle	Stream gradients in this area of Montana Gulch are steep (in excess of 15% in places) and minimize deposition in the stream channel. In the stream channel, the gravel appears to be less than 3 ft thick. Except for occasional andesite outcrops, bedrock is fractured rhyolite tuff (USFS 1988).	A plan of operations calls for about 10 sample trenches across the stream channel (USFS, 1988).	No data.
466	Jordan Creek Placer mine (T13N, R15E, sec. 29) George Castle	Placer gravels along Jordan Creek.	A 1983 plan of operations calls for sample trenches across Jordan Creek along 2,000 ft of the creek north of Montana Gulch (USFS , 1988).	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
467	Halloween (Kwajalein) mine (T13N, R15E, sec. 20) U.S. Antimony Corp.	The Kwajalein is the only strictly base-metal property in the district. It is in altered tufaceous beds a few tens of feet above the Wood River Formation. Ore is composed largely of chalcopyrite with subordinate galena and lesser pyrite and sphalerite. The extent of the deposit was not determined (Anderson, 1949, p. 31).	Underground workings, known as the Kwajalein, were developed during the 1940's and reopened by U.S. Antimony Corp. in 1985. This adit, and several more adits about 700 ft northeast of the original Kwajalein are called the Halloween and will be developed by U.S. Antimony Corp. Production of silver, copper, and lead are reported during 1951 (USBM, 1988).	Samples, taken by U.S. Antimony Corp., from the Kwajalein contained 6,906.2 oz/ton silver and 21.760 oz/ton gold. The mineralization was not in place, however, and further exploration is scheduled (USFS, 1988).
468	Sunbeam (Golden Sunbeam) mine (T13N, R15E, sec. 20) CoCa Mines Inc.	Tertiary volcanic rocks are host to epithermal gold-silver deposits on Sunbeam Mountain, where high-angle faulting and fracturing are present. The higher-grade, fracture-filled veins were the targets of past operations. The present targets are broader zones of disseminated gold and silver that surround the high-grade veins. Even though the orebody is confined mostly to fracture zones, and alteration is mere common there, the ore is low-grade, disseminated, and varies widely throughout the deposit (Gabardi, 1987, p. 9-14).	Early development included 5 adits with drifting, raising, and cross cutting in excess of 20,000 ft. The Sunbeam mine has reported production of $400,000 mostly from 1900 to 1910 (Umpleby, 1913c). Production records since 1910 are incomplete. The mine was discovered in the late 1800's and operated as the Golden Sunbeam mine for about a quarter of a century. Legal problems as well as declining quantities of high-grade ore resulted in the mine closing down in 1911. Mill tailings from the Golden Sunbeam mine were reprocessed from 1930 to 1942, and in 1946, the mill was refurbished and the mine was reopened. The mine produced until 1950. Interest in the Sunbeam property was rekindled in 1969 and in 1979, Geodome Petroleum Corp. (subsequently Geodome Resources Ltd.) acquired the Sumbeam claim group to explore and develop the Sunbeam property (Gabardi, 1987, p. 6-7). Sunbeam Mining Corp. was acquired in May, 1989 by CoCa Mines Inc., who plans to continue the permitting and pre development work begun by Sunbeam Mining Co. (Gregory Hahn, CoCa Mines Inc., personal commun., 1989).	Since 1978, over 450 rotary reverse circulation holes have been drilled and 1,600 ft of surface samples have been taken. In 1985, an independent consultant determined resources as follows: 2.2 million tons at 0.087 oz/ton gold, or 3.0 million tons at 0.071 oz/ton gold, or 4.1 million tons at 0.058 oz/ton gold, or 5.3 million tons at 0.049 oz/ton gold. The overall average grade for silver was 0.418 oz/ton (Gabardi, 1987, p. 18-19))

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
469	Whale (T13N, R15E, sec. 19) CoCa Mines Inc.	The Whale is on the first tributary of Jordan Creek above the (Golden) Sunbeam at an altitude of 8,000 ft, a few hundred yd northwest of the Jesse James. The zone of mineralization is 100 yd wide and several hundred yd long, trending N70°W. It cuts tuffs and a small body of rhyolite. Some fractures in silicified tuff have up to 18 in of gouge. The ore is a breccia type with silicified wall rock, pyrite, and banded chalcedony. A specimen of high-grade ore contained a thin seam of massive argentite in quartz. (Anderson, 1949, p. 34)	Workings include a shallow adit or cut about 220 ft long, mostly open to the surface, and several smaller cuts. Some ore was produced from the adit but data was not available. In 1947, the mine was optioned to Sunbeam Mines Inc. and ore was trucked to the Sunbeam mill (Anderson, 1949, p. 34). (This property is now part of) the Sumbeam mine (USBM, 1988).	No data.
470	Jesse James mine (T13N, R15E, sec. 19) CoCa Mines Inc.	Ore bodies in this area are typically stockworks of closely-spaced fractures in irregular masses and zones of mineralized tuff. A 500 ft wide alteration zone extends across the property in a N70°E direction with more mineralized fractures trending N30°E within the zone. The main ledge is a breccia of white quartz and silicified tuff in a cement of gray quartz. Tiny grains of gold are visible in iron-stained fractures filled with quartz (Anderson, 1949, p. 33).	The property is on the upper west slope of the same ridge as the (Golden) Sunbeam at an elevation of 8,200 to 8,500 ft. Workings consist of two long and several short adits. The longest and lowest adit is reported to contain 1,700 ft of workings and the next in length is 400 or 500 ft. In 1947 the slope was being prepared for hydraulicking. No production is reported (Anderson, 1949, p. 33).	No data.
471	Thunderbolt (T13N, R15E, sec. 21) John Lawrence	Quartz veins in volcanic tuffs and andesite. Veins contain chalcopyrite, galena, argentite, and gold (Anderson, 1949, p. 30).	One of several properties on Estes Mtn operated by U.S. Antimony Corp. (USFS, 1988).	No data.
472	Gold Star (T13N, R15E, sec. 21) John Lawrence	Workings cover the southwest extension of the Charles Wain vein. Veins in this area are iron-stained quartz, accompanied by ruby silver, with sulfides present in the lower workings (Anderson, 1949, p. 31).	Two adits, each of which is about 500 ft long (Anderson, 1949, p. 31). One of several properties on Estes Mtn operated by U.S. Antimony Corp. (USFS, 1988).	A select sample of carbonaceous tuff from a bulldozer trench contained 60 ppb gold, 1.1 ppm silver, 7 ppm copper, 20 ppm lead, 16 ppm zinc. The extent of the carbonaceous tuff was not evident. (USBM, 1988).
473	Why Not mine (T13N, R15E, sec. 21) John Lawrence	On the "Contact" vein (the same as the McFadden) which strikes N15°-20°E and dips 35°NW. Two shoots, each about 50 ft long and 4 to 5 ft wide are developed. The vein contained copper and lead ore, rich in silver and gold (Anderson, 1949, p. 30).	Three adits, one 700 ft long are reported. One of several properties on Estes Mtn. operated by U.S. Antimony Corp. (USFS, 1988). Production of gold, silver, copper, and lead from 1920 to 1941 (USBM, 1988).	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
474	Montana mine (T13N, R15E, sec. 21) John Lawrence	The Montana is on a fissure of northeasterly trend, but the ore was confined to a chimney like shoot 5 to 17 ft wide and 20 to 25 ft long, which extended to a depth of 350 ft (Anderson, 1949, p. 29). The Czizek tunnel intersected one of a series of fissures 1,700 ft from the portal. At this point, the vein was 1,000 ft below the surface and was 4 ft thick. Vein material contained chalcopyrite, sphalerite, galena, and pyrite, as well as wire silver and gold. Above the 250 ft level, the chief value was gold: below the ore became rich in silver (Bell, 1908, p. 75).	From 1877 to 1907, ore was developed from a 2,000 ft crosscut. Workings are reported to include 6 adits and levels 50 ft apart to a depth of 565 ft (Anderson, 1949, p. 29). The 4 ft vein in the Czizek tunnel carries about $40.00/ton in gold and silver with a pay streak 1 ft wide that carries $150.00/ton. The Montana vein is reported to have produced several hundred thousand dollars of ore with grades from $100.00 to $1,000.00/ton (Bell, 1908, p. 75). One of several properties on Estes Mtn. operated by U.S. Antimony Corp. (USFS, 1988). Production of $396,000 before it closed in 1918 is reported by Anderson (1949, p. 29). Production of gold and silver between 1913 and 1917 (USBM, 1988).	No data.
475	Arcade mine (T13N, R15E, sec. 21) John Lawrence	Two veins about 150 ft apart in altered volcanic rocks. One vein is reported to have mainly gold values and the other mainly silver values. No ore of shipping grade is reported. These veins are extensions of the Charles Wain vein (Anderson, 1949, p. 31).	Three adits totalling about 1,000 ft of workings (Anderson, 1949, p. 31). Production of gold, silver, copper and lead from 1937 to 1942 (USBM, 1988).	No data
476	McFadden mine (T13N, R15E, sec. 21) John Lawrence	The property is on the "Contact" vein which lies between tuff and latite or andesite, all of which is altered and silicified. The vein averages 3 to 4 ft wide, and is primarily quartz. Other minerals in the vein are chalcopyrite, pyrite, tetrahedrite, and galena with associated silver and gold in a ratio of 100:1 (Anderson, 1949, p. 30).	Caved workings are reported to contain 2,000 ft of development with an inclined shaft about 500 ft below the lower level. Production is reported at about $200,000 since 1878 (Anderson, 1949, p. 29). One of several properties on Estes Mtn. operated by U.S. Antimony Corp. (USFS, 1987). Production of gold, silver, copper, and lead from 1953 to 1956 (USBM, 1988).	No data.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
477	Charles Wain (T13N, R15E, sec. 21) John Lawrence	The property is high on the cirque wall which reaches across the top of Estes Mtn at the head of Eight Mile Creek. There are two veins extending across the top of the mountain: one strikes N40°E across the crest and is about 18 in wide, the other vein strikes N32°E and dips 50°NW and is 2.5 ft wide at the surface. The veins are primarily drusy quartz with a little ruby silver (Anderson, 1949, p. 31).	Several adits were driven just under the top of Estes Mtn. (Anderson, 1949, p. 31) One of several properties on Estes Mtn. operated by U.S. Antimony Corp. (USFS, 1988).	No data.
478	Snowdrift mine (T13N, R15E, sec. 21) John Lawrence	The ore is confined to thin quartzose seams in altered tuff along gouge-filled fractures. At least three mineralized fissure zones are exposed in underground workings. The fractures are of diverse trend, and most of the production has come from one zone which strikes N10°W and dips 74°SW (Anderson, 1949, p. 31).	Three adits. The two upper adits, one of which has 700 ft of drifts and crosscuts, are on the east side of the ridge, and the lowest adit, which is about 300 ft, is on the west side of the ridge (Anderson, 1949, p. 31). One of several properties on Estes Mtn. operated by U.S. Antimony Corp. (USFS, 1988). Production of gold, silver, copper, and lead from 1924 to 1948 (USBM, 1988).	No data.
479	Golden Gate mine (T13N, R15E, sec. 21) John Lawrence	The property is on the same "Contact" vein as the McFadden property. The vein lies between fine grained tufaceous hanging wall and an andesitic foot wall. Both walls are intensely altered. One ore shoot was reported but nothing was learned as to the tenor. The ore on the dump is identical to that at the McFadden. It shows the earlier quartz with coarse grains of chalcopyrite, galena, argentite, and pyrite, and the younger white drusy quartz (Anderson, 1949, p. 30)	An adit about 1,000 ft long, which is reported to tap the bottom of the McFadden shaft (Anderson, 1949, p. 30). Production of gold and silver was reported in 1901 (USBM, 1988). One of several properties on Estes Mtn. operated by U.S. Antimony Corp. (USFS, 1988).	No data.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
480	Tonto mine (T13N, R15E, sec. 16) John Lawrence	The mineralized zone is in tufaceous volcanics, but the ore appears to be confined to a small chimney-like body of mineralized fractures on the slope north of the Golden Gate. These fractures contain thin seams of quartz in which gold is visible (Anderson, 1949, p. 30).	A 65 ft shaft on the outcrop and an adit about 200 ft long on the slope below. The two are not connected. In 1947, the outcrop was being hydraulicked (Anderson, 1949, p. 30). One of several properties on Estes Mtn. operated by U.S. Antimony Corp. (USFS, 1988). Production of gold, silver, copper, and lead is reported for the Tonto Page (USBM, 1988).	No data.
481	Mountain Chief (T13N, R15E, sec. 17)	Host rock is altered Challis Volcanics. Workings are along a prominent fissure which strikes N30°E and dips 70°SE. This fissure is traceable for several hundred yards. It is about 1 ft wide and in places, iron stained. Drusy quartz surrounding breccia fragments of the altered tuff is exposed on the dump of one of the cuts (Anderson, 1949, p. 31).	Seven pits and a dozen cuts totalling about 110 ft (USBM, 1988).	One three-ft chip sample across a shear zone, contained 0.014 oz/ton gold, 0.6 oz/ton silver and no copper. One grab sample contained no gold or silver (USBM, 1988).
482	Gold prospect (T13N, R15E, sec. 16)	Silicified tuff has minor iron-oxide and manganese-oxide stains (Ridenour, 1985, p. 67, no. 19).	Eight small pits (Ridenour, 1985, p. 67).	Two chip samples: no gold or silver detected (Ridenour, 1985, p. 67).
483	Silver and gold prospect (T13N, R15E, sec. 16)	Light gray, silicious tuff which locally contains felsic dikes and shear zones with minor pyrite (Ridenour, 1985, p. 67, no. 20).	Two adits, 85 ft and 60 ft long, and two pits (Ridenour, 1985, p. 67).	Four chip samples of shear zone: no gold or silver detected (Ridenour, 1985, p. 67).
484	Silver and gold prospect (T13N, R15E, sec. 16)	Welded rhyolite tuff has minor iron-oxide stains (Ridenour, 1985, p. 67, no. 18).	Four small pits (Ridenour, 1985, p. 67).	Two chip samples: no gold or silver detected (Ridenour, 1985, p. 67).
485	Prospect (T13N, R15E, sec. 16)	Challis volcanics.	Topo map location.	No data.
486	Silver prospect (T13N, R15E, sec. 17)	Light greenish-gray welded tuff (Ridenour, 1985, p. 67, no. 17).	Two small pits (Ridenour, 1985, p. 67).	One chip sample: no gold or silver detected (Ridenour, 1985, p. 67).
487	Silver and gold prospect (T13N, R15E, sec. 17)	Silicious, rhyolitic tuff has minor iron-oxide and manganese stains (Ridenour, 1985, p. 67, no. 21).	One adit, 23 ft long, and a small pit (Ridenour, 1985, p. 67).	One chip sample: 0.3 oz/ton silver; no gold detected (Ridenour, 1985, p. 67).
488	Silver and gold prospect (T13N, R15E, sec. 17)	Quartz monzonite cut by a small zone which is hydrothermally altered and contains minor amounts of specular hematite (Ridenour, 1985, p. 67, no. 22).	One shaft about 6 ft deep (Ridenour, 1985, p. 67).	One chip sample: no gold or silver detected (Ridenour, 1985, p. 67).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
489	Gold prospect (T13N, R15E, sec. 17)	Iron-oxide-stained silicious tuff (Ridenour, 1985, p. 67, no. 23).	Three small pits (Ridenour, 1985, p. 67).	One chip sample: no gold or silver detected (Ridenour, 1985, p. 67).
490	Fluorspar occurrence (T13N, R15E, sec. 7) Dale Eskridge	A fault zone strikes N40°E, and dips 55°NW in andesite flows. The zone is about 2.5 ft thick with fluorspar occurring as pale yellow or green cubes and octahedra ranging from microcrystalline druses to about 1/8 in. in size. Fluorspar occurs in fractures as seams and veinlets ranging from 1/16 in to about 1/2 in thick. The zone may be an extension of the Lamb Prospect (Ridenour, 1985, p. 68).	None (Ridenour, 1985, p. 68).	One chip sample contained 41% CaF_2 (Ridenour, 1985, p. 68).
491	H U H Bros. (T13N, R15E, sec. 18) Mark Anderson	Jordan Creek stream gravels.	Proposed sluice and small suction dredge operation (USFS, 1981).	No data.
492	Wangler group (T13N, R15E, sec. 7)	Brecciated and silicified rhyolite intruded by basic dikes is capped by basalt flows. Minor pink fluorite and calcite are in a breccia zone.	None.	Three chip samples: one sample contained 1.9% fluorite (Ridenour, 1985, p. 67, no. 24).
493	Lamb prospect (T13N, R14E, sec. 13) Van Lamb	Fluorite occurs in a series of veins, stringers, and breccia filings along a northeast-trending zone at least 1 mi long and several hundred yards wide. The thickest individual veins, up to 14 in, crop out on the southern and eastern slopes, one mi southeast of Mount Jordan. Host rocks are fractured andesite and rhyolite flows (Choate, 1962, p. 89).	Exploration and prospecting (Choate, 1962, p. 89).	A sample, taken across a 14 in vein in a 300 ft long zone with an attitude of N10°W, 20°SW on the eastern slope, contained 49.2% CaF_2. A four ft sample, taken across a zone with attitude of N45°E, 64°NW and traceable for 600 ft on the southern slope, contained 39.4% CaF_2 (Choate, 1962, p. 89).
494	Silver prospect (T13N, R14E, sec. 11)	Quartz monzonite has xenoliths of metasedimentary rock (Ridenour, 1985, p. 68, no. 27).	One 20-ft-long adit (Ridenour, 1985, p. 68).	One chip sample of metasediment: no gold or silver detected (Ridenour, 1985, p. 68).
495	Spotted Bear group (T13N, R14E, sec. 12) Carlyle Castle	Quartz monzonite has xenoliths of argillite locally exhibiting phyllitic to schistose texture (Ridenour, 1985, p. 68).	Four pits and two caved adits less than 50 ft long (Ridenour, 1985, p. 68).	Four chip samples and one grab sample of argillite: one sample contained 0.42% copper (Ridenour, 1985, p. 68).
496	Poacher group (T13N, R14E, sec. 2) Noranda Exploration, Inc.	A metasedimentary xenolith is in quartz monzonite. The lower pit is in schist. The upper pit is in schist and just below a granite/volcanic rock contact.	Three small pits, two are sloughed.	One chip sample and two grab samples of schist. The chip sample had 0.056 oz/ton gold, 1.5 oz/ton silver, and 1.96% copper (Ridenour, 1985, p. 68, no. 28).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
497	Laka placer (T13N, R15E, sec. 13) A. L. Jacobs	Massive and bedded rhyolite form cliffs along Eightmile Creek. Gravel is limited to small bars from 3 to 5 ft thick in the stream channel (USBM, 1988).	No evidence of recent or past activity in 1988.	No data.
498	Pepe Pappy & Grandpas Follie (T13N, R16E, sec. 16) Brian Burge	Placer gravels along a steep-sided narrow section of Yankee Fork. Small placers with high boulder content make large scale operation unworkable (USBM, 1988).	A 1982 plan of operations calls for us of a sluice box and suction dredge to work stream gravel (USFS, 1988).	No data.
499	Thompson Creek Tungsten mine (T12N, R16E, sec. 28) Cyprus Minerals Corp.	Paleozoic sedimentary rocks have been intruded by the Idaho batholith. Tertiary volcanic rocks overlie the Paleozoic and intrusive rocks regionally. Strongly silicated tactite was formed in limestone beds in the lower member of the Wood River Formation. Disseminated scheelite and arsenopyrite are associated with high-angle, north-trending normal faults at two locations. The west orebody appears to be 150 m long, 60 m deep, and 5 m thick. The east ore zone appears to be 170 m long, from 24 to 49 m deep, and 3 m thick. The ore bodies appear to be fault bounded, which reduces the possibility of extensions (USBM, 1988).	The property is developed by at least 1,100 m of drifting and crosscutting on three levels and several hundred meters of trenches. There have been 760 m of exploratory drilling (diamond and long hole). A mill, constructed in 1967, was located 12 kilometers southeast of the mine (USBM, 1988). Production of WO_3 from the west ore body is reported for the years 1954 to 1980 (USBM, 1988).	There are estimated to be 189,000 tons of ore remaining with an average grade of 0.93% WO_3. About 4,000 tons of material is stockpiled (USBM, 1988). Two samples of stockpiled material taken in 1987 averaged 0.14% WO_3 (USBM, 1988). A grab sample of a stockpile containing ferberite and scheelite in skarn material along limestone-granite contact contained 20 ppb gold, 1.4 ppm silver, 452 ppm copper, 2 ppm lead, 748 ppm zinc, 575 ppm tungsten (USBM, 1988). A grab sample of arsenopyrite-quartz-scheelite-garnet skarn from a stockpile contained 10 ppb gold, 0.4 ppm silver, 406 ppm copper, 2 ppm lead, 201 ppm zinc, 1545 ppm tungsten (USBM, 1988).
500	Buckskin (T12N, R16E, sec. 34) Cyprus Minerals Corp.	Country rocks in this area are Paleozoic argillite and dolomitic limestone. Regionally, Tertiary volcanic rocks overlie the sedimentary beds. Idaho batholith rocks crop out locally and probably underlie the sedimentary beds. Where exposed, the dolomitic and more limey members have been metamorphosed to tactite and carry sphalerite and some disseminated scheelite. Galena and silver minerals were detected in a series of parallel quartz veins which cross the property (USBM, 1988).	Four partially accessible adits, the longest 280 ft, have been developed on the auartz veins. Trenching and one adit, 133 ft long, were developed on the tactite zone. No production is reported (USBM, 1988). This area is now part of the Thompson Creek Molybdenum mine.	Four surface samples and 1,400 ft of diamond drilling was done around 1955, as part of a DMEA project. Surface samples of tactite outcrops contained from 0.03% to 0.71% WO_3 across widths ranging from 0.8 ft to 30 ft. Zinc ranged from 0.2% to 0.5% and silver ranged from 0.02 oz/ton to 0.84 oz/ton in three surface samples (USBM, 1988).
501	Rain in the Face (T12N, R16E, sec. 34)	Just across Buckskin creek from the Buckskin property. An adit reportedly followed a small quartz vein with molybdenite (Ross, 1937, p. 148).	Caved workings, not extensive, on 2 unpatented claims (Ross, 1937, p. 148).	No data.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
502	Thompson Creek Molybdenum mine (T11N, R16E, sec. 2) Cyprus Minerals Corp.	The three rock units in the Thompson Creek area are Paleozoic sedimentary rocks, Idaho batholith, and Challis Volcanics. The deposit is confined to the quartz-monzonite core of the Thompson Creek granodiorite & quartz-monzonite stock. Better grade molybdenum mineralization is confined to a northwest-trending zone of potassium silicate alteration in the quartz-monzonite. In this zone are a large number of quartz-biotite-feldspar-muscovite veins containing the majority of the molybdenum mineralization (USBM, 1988).	From 1967 to 1978, Cyprus Minerals Co. and Noranda Exploration completed 256,785 ft of exploratory drilling and 8,497 ft of underground drifting. Large-scale open pit mining and flotation milling began in 1983 (USBM, 1988). Cyprus Minerals Co. reports annual production of: 1984, 10.5 million lb MoS_2 1985, 16.4 million lb MoS_2 1986, 15.0 million lb MoS_2 1987, 7.5 million lb MoS_2 1988, 13.9 million lb MoS_2 (Lowe and others, in preparation, Cyprus Minerals Co., 1989).	In 1984, resources were estimated at 233,000,000 tons of ore at an average grade of 0.11% MoS_2. (Lowe and others, in preparation).
503	Berbes (T11N, R16E, sec. 13) Russ Berbes	Stream gravels of Thompson Creek.	A 1980 plan of operations called for placer mining of alluvium in Thompson Creek using "heavy equipment" (USFS, 1988).	No data.
504	Sure Shot mine (T11N, R16E, sec. 25)	A shear zone containing quartz veins and pods. Country rock is quartz monzonite. (Van Noy and others, 1986, p. 276)	Two caved adits and four pits (Van Noy and others, 1986, p. 286). Production of silver and lead is reported in 1939 (USBM, 1988).	Two chip samples: up to a trace gold, 0.3 oz/ton silver, and minor zinc, lead, and copper. (Van Noy and others, 1986, p. 276)
505	Bruno mine (T12N, R16E, sec. 25) Jim Ennis; Cyprus Mining Co.	Quartzite, limestone, dolomite and argillite are intruded by latite porphyry in the area of the Cinnabar mine. Lead and silver mineralization occurs in gossan zones in fractured limestone (Martin Cole, Cyprus Minerals Co., personal commun., 1988).	Two adits, one 500 ft and another 300 ft long, as well as several adits of unknown length. One shaft, 656 ft deep (Ross, 1937, p. 147; Campbell, 1924, p. 91). Reported production of $100,000 in lead-silver ore (Umpleby, 1913c, p. 76). In 1987, Cyprus Minerals Co. began an exploration program on the property. The program included surface and soil sampling, the reopening of one or more adits for mapping and underground sampling, and the drilling of 8 exploratory holes (Martin Cole, Cyprus Minerals Co., personal commun., 1988).	No resources were identified during recent work by Cyprus Minerals Co.. The company maintains a lease on the property from the owner, Jim Ennis (Martin Cole, Cyprus Minerals Co., personal commun., 1989).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
506	Flagstone 1-7 mine (T12N, R17E, sec. 33) Tom Demorest	Rocks of the Kinnikinic Quartzite are exposed in a cliff face and as talus which has sloughed from the cliff. The rocks are slatey shale, and quartzite. Bedding planes are so close together that the stone has limited use as a building stone (USFS, 1988).	About 60 tons of material has been removed as a royalty basis purchase in 1975 (USFS, 1988).	USFS engineers estimate an astronomical amount of stone present (USFS, 1988).
507	Cash Creek prospect (T12N, R17E, sec. 15) Archie Sherwood	A galena- and malachite-bearing quartz vein 1 to 2 ft thick is along a fault zone that crosscuts beds of hornfelzed, argillaceous quartzite. The fault zone strikes N20°E and dips 85°SE; the quartzite beds strike N30°W and dip 25°NE. About 1/4 mi northwest of the prospect is a rhyolitic intrusion and associated flows and dikes.	An 8-ft-long adit follows the dip of the vein. At the portal adit is a bulldozer cut and compressor.	Two 1988 USBM samples were taken: a 2-ft-long sample across the exposure in the adit assayed 65 ppm gold, 94 ppm silver, 137,000 ppm lead and 160 ppm zinc. A 1-ft-long samples across an exposure that is 40 ft southeast of the adit contained 150 ppb gold, 96 ppm silver, 22,600 ppm copper, 75,700 ppm lead and 620 ppm zinc. The vein is too poorly exposed to estimate resources.
508	Prospect (T12N, R17E, sec. 36)	Quartzite boulders on volcanic bedrock (USBM, 1988).	Area appears to have been placered (USBM, 1988).	A grab sample of quartzite gravel above basalt bedrock contained 15 ppb gold, 0.4 ppm silver, 76 ppm copper, 560 ppm lead, 90 ppm zinc (USBM, 1988).
509	Maude and Vermont Lodes (T12N, R18E, sec. 32)	Mineralized shear zones are poorly exposed in calcareous-metasedimentary beds near contacts with shale, slate and quartzite. The beds trend north and dip west; the shear zones trend northeast, dip west, are as thick as 6 ft, and contain sulfide-bearing quartz lenses.	In an area 1/4 mi wide (westerly) and 1 mi long (northerly) are; one open and three caved adits, bulldozer trenches over many of the adits, numerous hand dug prospect pits and trenches and an access road. The adits total more that 900 ft. No production has been recorded nor is there any evidence that ore was produced from any of the workings. The Maude and Vermont Lode claims were patented in 1915 and 1895 respectively.	Seven 1988 USBM samples were taken: three 2-ft to 6-ft-long chip samples across shear zones contained between nil to 15 ppb gold, 1.2 ppm and 25 ppm silver, 45 ppm and 2,000 ppm copper, 470 ppm and 130,000 ppm lead and 245 and 22100 ppm zinc. Four grab samples from stockpiles and dumps assayed as much as 60 ppb gold, 3624 ppm silver, 84200 ppm copper, 4,300 ppm lead and 7,600 ppm zinc. Poor exposures do not allow an estimate of resources.
510	Silver Bell mine (T11N, R18E, sec. 5)	A zone of fissuring, up to 100 ft wide, in Paleozoic slate. The vein strikes N60°W and dips 30°NE and consists of tetrahedrite in a siderite gangue, with malachite, azurite, cerargyrite and argentite (Umpleby, 1913c, p. 72).	10,000 ft of adits to a depth of 100 ft. The vein was mined to within 5 ft of the surface. Total copper-silver production reported at $600,000, from 1879 to 1897 (Ross, 1937, p. 135). Production of gold, silver, copper, lead, and zinc from 1911 to 1959 (USBM, 1988).	A select sample of phyllite and quartz from a stockpile at a collapsed adit contained 5 ppb gold, 0.4 ppm silver, 60 ppm copper, 22 ppm lead, 83 ppm zinc (USBM, 1988). Phyllite and quartz from another stockpile contained no gold, 10 ppm silver, 1,700 ppm copper, 48 ppm lead, 340 ppm zinc (USBM, 1988).

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
511	Last Chance (Big Pine) mine (T12N, R18E, sec. 27) Jacob Schink	The prospect, located outside the Challis Forest, was examined to determine if it extends into the forest; it does not. At the prospect are irregular replacement lenses along fractures that follow the north-trending, contact zone between dolomitic-limestone and shale. Nearby is an andesitic intrusion. The limestone strikes N20°-30°W and dips 50°SE; the shale strikes N25°W and dips 20°-30°SW. The contact zone parallels the forest boundary but does not cross into the forest. The lenses are as thick as 6 ft and composed of quartz, barite, siderite, galena, sphalerite, pyrite, malachite and limonite.	For about 600 ft along the contact zone are three caved adits that are estimated to total about 1,000 ft, a few hundred feet of bulldozer trenches, numerous hand dug pits and trenches, a cabin and the access road. USBM records and Fisher and Johnson (1987, p. 100), indicate that 2 oz of gold, 6,898 oz of silver, 2,428 lb of copper and 120,300 lb of lead were produced between 1908 and 1921.	Four 1988 USBM samples were taken: two 1.5-ft to 6.0-ft-long chip samples of quartz had less than 125 ppb gold, 46 ppm silver, 48 ppm copper, 140 ppm lead and 225 ppm zinc. Two grab samples of mineralized material from the dumps contained as much as 40 ppb gold, 514 ppm silver, 4,600 ppm copper, 36,000 ppm lead and 5,300 ppm zinc.
512	Juliet Lode (T12N, R18E, sec. 8)	No mineralized structure is exposed. Working alignments and dump material indicate sulfide-bearing quartz lenses are along bedding-plane shear zones in calcareous-shale near its contact with dolomite and a granitic intrusion. The shale strikes N70°E and dips 35°NW. Lens material on the dump is as thick as 0.5 ft and contains limonite, pyrite and malachite.	For about 300 ft along a gully that flows east into Julliette Creek are three caved prospect pits and a flooded adit that is at least 200 ft long. On the opposite site of Julliette Creek (east side) are a caved shaft and collapsed cabin. (The Juliet Lode was patented) in 1881.	One 1988 USBM sample, a grab sample of lens material, contained 40 ppb gold, 7.5 ppm silver, 185 ppm copper, 256 ppm lead and 430 ppm zinc.
513	Arizona prospect (T12N, R18E, sec. 5)	A shear zone striking N40°W and dipping 49°SW is along the contact between siltite and quartzite. The shear zone is limonitic and 0.7 ft to 1.0 ft thick.	One 45-ft-long crosscut adit was driven N70°W.	Two chip samples were taken across the zone. One assayed 136 ppm zinc and the other 36 ppm zinc.
514	Virginia Dare prospect (T13N, R18E, sec. 31)	No mineralized structure is exposed. Indicated are galena-, pyrite-, chalcopyrite-, pyrite-, siderite- and malachite-bearing quartz lenses along N70°-80°W striking, bedding-plane-fractures in Ramshorn Slate near a granitic intrusion.	Three caved adits are scattered along a northwest trending gully. The adits are estimated to total of less than 500 ft.	Two 1988 USBM samples were taken from small stockpiles. These samples contained as much as 100 ppb gold, 58 ppm silver, 10,400 ppm copper, 5,800 ppm lead and 7,300 ppm zinc.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
515	Skylark mine (T13N, R18E, sec. 32) Inspiration Development Inc.	The Skylark mine is on a northerly extension of the Ramshorn mine vein system. The numerous, northerly trending, westerly-dipping, fissure-veins at the Skylark mine are in slate that is intruded by granitic rocks. The ore in the veins is in lenses that are as thick as 6 ft and that are composed of native silver, pyrargyrite, native copper, cerargyrite, argentite, and malachite in a gangue of siderite, crushed and altered slate, pyrite and quartz (Ross, 1937, p. 122).	Sixteen large and several smaller adits total about 18,000 ft of workings; most are inaccessible. A cabin, an ore bin and several hundred feet of bulldozer trenching and drill site preparation are also on the site. The mine is covered by two claims that were patented in 1881 and 1887. Before 1901, $2.5 million worth of ore from the Skylark mine was processed at the Clayton smelter. This ore averaged 8% copper and 80 oz/ton silver (Ross, 1937, p. 123). Fisher and Johnson (1987, p. 107), report that 1 oz of gold, 2,616,000 oz of silver and 5,623,000 lb of copper have been produced from the mine.	Two 1988 USBM grab samples contained as much as 145 ppb gold, 799 ppm silver, 236 ppm copper, 2,020 ppm lead and 1,400 ppm zinc. Although resources likely remain in old workings, none are reported.
516	Ramshorn mine (T13N, R18E, sec. 32) Inspiration Development Inc.	Beds of quartzite, slate and limestone, intruded by granitic rocks, are overlain by volcanic tuff and rhyolite. In the slate is a system of, north-trending, 50°SE dipping fissure veins which cut bedding planes. The vein system has been traced for nearly 7,000 ft along strike and 4,000 ft down dip. The veins have sharp contacts and contain 0.5-ft to 6-ft-thick lenses of tetrahedrite, galena, chalcopyrite, pyrite, arsenopyrite, and sphalerite in siderite, crushed and kaolinized slate, and quartz.	At least 17 adits with 10 intermediate levels total about 6.5 mi of underground workings. Most workings are inaccessible or obscured by the recent bulldozer trenching and drill site preparation. A tramway and 60 ton/day mill, operated from 1917 to 1925, are dismantled. The mine reportedly operated almost continuously between 1877 and 1927; and intermittently until 1964. The mine is covered by six claims that were patented between 1887 and 1906. Bell reports that $2.5 million in silver, copper and gold were produced before 1901. Produced between 1902 and 1964, were 145 oz of gold, 2,101,962 oz of silver, 926,609 lb of copper, 5,688,604 lb of lead and 23,200 lb of zinc (Fisher and Johnson, 1987, p. 100).	The Inspiration Development Company carried out an exploration program that included drilling during the early 1980's. No discovery of mineral resources was reported. Three 1988 USBM samples were taken from the surface. The samples contained as much as 300 ppb gold, 2,835 ppm silver, 24,800 ppm copper, 128,000 ppm lead and 7,600 ppm zinc.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
517	Barton mine (T13N, R18E, sec. 4)	Sulfide-bearing quartz lenses are along poorly-exposed shear zones in slate and quartzite. Nearby is a granitic intrusion. The zones examined trend north, dip east and are as thick as 4 ft. They are composed of limonitic-breccia and the quartz lenses with pyrite and arsenopyrite.	In and area that is about 1,000 ft long (northerly) and 500 ft wide are a 36-ft-long adit and several prospect pits. Bell (1904, p. 52), reported that some ore was produced in 1903. USBM files indicate that 1,573 lb of lead were produced.	Two chip samples were taken during the USBM examination. A 4-ft-long sample across a shear zone exposure in a pit assayed 10 ppm gold, 0.9 ppm silver, 63 ppm copper, 106 ppm lead and 70 ppm zinc. A 3-ft-long sample across a quartz lens exposed in the adit had 4.2 ppm silver, 140 ppm copper, 168 ppm lead and 160 ppm zinc.
518	Toolie (T13N, R18E, sec. 34)	Narrow quartz veins are along bedding in quartzite and shale. The veins trend about N10°E and dip 80°NW. They contain limonitic stringers and pockets after pyrite (?) and galena (?). A silicified replacement zone in limestone at the shaft strikes N60°E, dips 45°NW, and contains vuggy, galena-bearing quartz.	One shaft 33 ft deep, 45-ft-long bulldozer trench, and two small pits.	Three 1988 USBM chip samples from quartz veins contained 20 to 150 ppb gold. A sample from the replacement zone also contained 11.5 ppm silver, 29 ppm copper, 4350 ppm lead, and 2400 ppm zinc. The other two samples each contained 1.8 ppm silver, 56 and 86 ppm copper, 90 and 358 ppm lead, and 470 and 140 ppm zinc. A grab sample of quartz from the bulldozer trench contained 55 ppm lead, and 116 ppm zinc.
519	Cave mine (T13N, R18E, sec. 34) Inspiration Development Inc.	Replacement lenses are along a bedding shear zones in calcareous metasedimentary rocks; nearby are granitic intrusive rocks. The lenses strike N50°-70°W, dip 40°-85°NE, are 1.1 ft to 3.0 ft thick and composed of breccia with quartz, amethyst, galena, tetrahedrite and malachite.	Development consists of a shaft, a 840-ft-long adit, several small adits, many small pits and trenches, bulldozer trenches, drill sites and an access road. The underground workings total about 1,800 ft. The Cave Lode was patented in 1920. Unreported amounts of gold, silver, copper and lead were produced in 1903 (Umpleby, 1913c, p. 72). Produced between 1908 to 1910 were 1 oz of gold, 2,328 oz of silver, 666 lb of copper and 29,767 lb of lead (USBM, 1988; Fisher and Johnson, 1987, p. 99).	Three samples were taken during a USBM examination. A select sample of lens material from an adit dump assayed 235 ppb gold, 2,009 ppm silver, 12,000 ppm copper, 154,000 ppm lead and 2,500 ppm zinc. A 1.1-ft and a 3-ft-long chip sample across lenses exposed in the workings had 500 ppb and 105 ppm gold, 1,950 ppm and 432 ppm silver, 41,400 ppm and 4,200 ppm copper, 49,900 ppm and 14,100 ppm lead and 52,100 ppm and 20,000 ppm zinc respectively. Exposures are to sparse to allow an estimate of resources. However, sample analyses indicate exploration could disclose resources.

Table A-3.--Mines and prospects in the Yankee Fork Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
520	Keno mine (T13N, R18E, sec. 34) Inspiration Development Inc.	A replacement lens is along bedding is argillaceous and silicified calcareous rock that strikes N70°-80°W and dips 10°NE. The 3-ft-thick lens is composed of gouge and quartz with galena, tetrahedrite and azurite.	An adit with a double entry follows the lens for about 90 ft. The mine is covered by the Keno Lode which was patented in 1896. Produced in 1902, were 121 tons of ore from which 8 oz of gold, 9,885 oz of silver and 118,533 lb of lead were recovered. In 1911, the Keno and Pacific together produced 10 tons containing 0.28 oz of gold, 734 oz of silver, 2,236 lb of copper and 12,026 lb of lead (Ross, 1937, p. 129).	A 3-ft-long chip sample was taken during the 1988 USBM examination across the lens exposure at the portal of the adit. This sample assayed 530 ppb gold, 524 ppm silver, 9,500 ppm copper, 97,500 ppm lead and 383,000 ppm zinc.
521	Forest Rose mine (T13N, R18E, sec. 34) Inspiration Development Inc.	Poorly-exposed mineralized lenses are in breccia along the crest of a small fold in shale that strikes N20°E. The lenses mined were as thick as 6 ft and contained quartz, galena and malachite.	An adit, at least 600 ft long with 2 raises in ore; a shop and a mine access road. The Forest Rose Lode was patented in 1896. Produced between 1901 and 1925, were 173 tons of ore containing 1 oz of gold, 6,623 oz of silver, 927 lb of copper and 123,690 lb of lead (Ross, 1937, p. 130 and Fisher and Johnson, 1987, p. 100).	During the 1988 USBM examination a sample of lens material was taken from the adit. This sample assayed 95 ppb gold, 500 ppm silver, 2,780 ppm copper, 111,000 ppm lead and 65,700 ppm zinc.
522	Pacific mine (T13N, R18E, sec. 34) Inspiration Development Inc.	Zones of fluorite- and lead-silver-zinc-bearing lenses are in breccia in dolomite near its contact with overlying slate. The breccia is tabular and conforms generally to bedding that strikes N15°-30°W and dips 15°-35°SW along the west limb of a northerly trending anticline. Thickness of the breccia is variable but averages about 20 ft. In the main fluorite zone, which is above or inside the metal-bearing zone, fluorite has replaced finely brecciated beds of dolomite. The metal-bearing lenses are generally along the crests of small, north-trending folds. They contain quartz, calcite, argentiferous galena, cerussite, anglesite, smithsonite, sphalerite, hemimorphite, pyrite, malachite, cerargyrite and tetrahedrite.	Underground workings total at least 5,300 ft on nine levels; an area 360 ft by 400 ft has been extensively stoped and little more than pillars remain (Chambers, 1966). The mine is included in 14 mining claims that were patented between 1896 and 1921. Between 1901 and 1964, 19,373 tons of ore yielded 1,817,774 lb of lead, 145,320 oz of silver, 359,166 lb of zinc, 32,813 lb of copper and 83 oz of gold (USBM, 1988; Fisher and Johnson, 1987). No fluorite production is reported.	The metals-bearing ore averaged 4.6% lead, 7.3 oz/ton silver and 1% zinc. Apparently no new metallic resources remain. Identified fluorite resources total 3.2 million tons averaging 36% CaF_2 (Snyder, 1978, p. 207).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
523	Sheep Mountain (T9N, R18E, sec. 19) Sungold, U.S.A., Inc.	A zone of quartz veins and argillic alteration strikes predominantly N15°-20°E and dips 50°NW in intermediate-composition intrusive rocks, pyroclastic rocks, and lava flows. The veins follow structural grain in the rocks along with dike swarms and high angle normal faults. The veins are mostly less than 1 ft thick; lengths are a few tens to hundreds of feet. Sparse pyrite is the only sulfide mineral reported (Fisher and others, 1983).	A 1988 plan of operations proposed exploration drilling of 5 to 10 diamond drill holes with depths of 200 ft to 1,000 ft (USFS, 1988). No workings are reported.	Twenty-four rock chip samples (Fisher and others, 1983) contained 10 to 60 ppm zinc in addition to one with 420 ppm and 10 to 80 ppm arsenic in addition to three with 140 to 400 ppm. The samples also contained as much as 13 ppm antimony, 0.15 ppm gold, 5 ppm silver (in addition to one with 20 ppm), 50 ppm molybdenum, 30 ppm copper, and 100 ppm lead. Gold was detected in 25% of the samples; 50% of the samples were anomalous in one or more metals. Results of the proposed drilling are unknown.

Table A-4.--Mines and prospects in the Lost River Ranger District

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
524	Sweets Park Canyon (Urexco) (T7N, R19E, sec. 18) Exxon Minerals	An 8-in-thick sheared zone in siltstone contains traces of torbernite. The zone strikes N27°E and dips 73°NW.	One 40-ft-deep shaft, open cuts. Drilling of the site by Exxon Minerals was planned for 1979 (USFS, 1988).	One sample contained 0.003 to 0.03% beryllium and 0.39% U_3O_8 (USBM, 1988). The sheared zone had elevated scintillometer counts for 275 ft along strike.
525	Old Cabin 1-3 (T7N, R19E, sec. 18) (Ted Arbogast)	Apparently underlain by Tertiary andesite and Mississippian clastic rocks of the Copper Basin Formation.	Three bulldozer cuts.	Three 1972 USFS samples showed no valuable minerals (USFS, 1988).
526	Bartlett Creek prospect (Get Set, Ready, Go, Mini group) (T7N, R19E, sec. 22) Rocky Mountain Energy Co.	Clastic sediments of Copper Basin Formation are cut by northwest- trending, high-angle faults which offset two or more low-angle faults. Granitic rocks of the Summit Creek stock underlie the area. Anomalous amounts of uranium and vanadium are along both high- and low-angle faults, mainly in graphitic argillite. Ore minerals are torbernite, autunite, and minor pitchblende in a gangue of limonite, quartz, and barite (Kendall, 1982).	One 632 ft adit was completed in 1981; three underground holes were drilled 323 ft, 413 ft, and 780 ft (Kendall, 1982).	Scintillation counter readings at one surface site were 16 times background. One sample from the site contained 0.11% U_3O_8 and 0.07% vanadium (Tuchek and Ridenour, 1981, p. 219, no. 16). Sporadic ore-grade uranium intercepts were found in 1981 along the first 100 ft of drifting. Drill hole samples revealed seven intercepts 5.5 to 9.5 ft long with 0.013% to 0.032% equivalent U_3O_8 (Kendall, 1982).
527	Bluebird (T7N, R18E, sec. 22) (Ted Arbogast)	A fault zone in carbonaceous shale of the Wood River Formation contains abundant pyrite.	One 20-ft adit.	One 1972 USFS sample contained no economically significant mineral values (USFS, 1988, p. 10, no. 13).
528	Prospect (T7N, R18E, sec. 32)	A N8°W-trending, 75°NE-dipping, 2-ft thick shear zone in argillite is explored. The shear zone contains traces of pyrite.	One 7-ft-long trench.	One 2.0-ft-long chip sample across the shear zone contained no significant metallic mineral concentrations (Johnson, 1983).
529	Bear Creek prospect (T7N, R18E, sec. 27) Westmont Mining, Inc.	Stratabound lead-zinc-silver mineralization in Devonian black shale has been traced for about 12,000 ft along a northerly trend. Thickness is variable, controlled in part by isoclinal folding of the shale.	Grid soil surveys and drilling; exploration begun in 1987 by Westmont Mining, Inc., Spokane, WA is expected to continue in 1989 (John Hiner, personal commun., 1989).	Drill holes have intercepted lead-zinc-silver mineralization at depth.
530	Prospect (T7N, R18E, sec. 35)	An irregular quartz vein in black, fissile argillite is near an andesite porphyry dike contact. The vein strikes N10°-30°E and dips 75°W. It ranges from 0.5 to 3.0 ft thick and can be traced for 100 ft on the surface. The quartz is limonite stained and contains less than 1% disseminated pyrite.	One caved shaft and one sloughed pit.	Two samples of quartz and one of iron-oxide stained andesite porphyry contained trace gold, copper, and lead, and 0.1 oz/ton silver (Tuchek and Ridenour, 1981, p. 218, no. 1).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
531	Long Trail mine (T6N, R18E, sec. 11) Leonard Wall	A quartz vein in thin-bedded slate and argillite contains pyrite, sphalerite, galena, and chalcopyrite. The vein strikes N60°W, dips 55° to 60°NE., and averages 2.5 ft thick.	Shallow trenches exposed a strike length of 130 ft; a short, caved adit and two cabins are also present. During 1943-1944, 36 tons of ore were shipped that yielded 602 oz silver, 1,637 lb lead, and 4,411 lb zinc (Tuchek and Ridenour, 1981, p. 196). Development work to mine a small tonnage of high-grade ore was done in 1987 (Leonard Wall, personal commun., 1987).	A stockpile sample contained 19.5 oz/ton silver, 7% lead, and 13.5% zinc. A grab sample of the dump contained 6.3 oz/ton silver, 2.78% lead, and 8.75% zinc. An inferred resource of 67,000 tons contains about 19 oz/ton silver, 7% lead, and 13% zinc (Tuchek and Ridenour, 1981, p. 212).
532	Prospect (T6N, R18E, sec. 11)	Vuggy, limonite-stained, honeycomb quartz with small amounts of malachite from vein which may have been as thick as 8 in. Structure not exposed.	Two sloughed cuts.	One sample; 0.9 oz/ton silver (Tuchek and Ridenour, 1981, p. 218, no. 3).
533	Lucky Strike prospect (T6N, R18E, sec. 11)	Quartz vein striking N83°W and dipping 40°NE in argillite and sandstone. Finely crystalline pyrite and galena comprise as much as 20% of the rock.	Small inclined shaft and two sloughed adits.	One sample; trace gold, 0.2 oz/ton silver, 0.30% lead, and 0.02% zinc (Tuchek and Ridenour, 1981, p. 218, no. 4).
534	Prospect (T6N, R18E, sec. 11)	Quartz stringers, veinlets, and veins in gray argillite; zone trends northwestward. Much gossan present.	Three cuts.	Three chip samples; trace gold, as much as 0.8 oz/ton silver, 0.5% lead, and 0.08% zinc (Tuchek and Ridenour, 1981, p. 218, no. 6).
535	Alto Silver-Quartz group (T6N, R18E, sec. 11)	Shear zones strike N75°W and dip 45°-80°NE in calcareous slate with interbeds of argillite and sandstone. The zones average about 3 ft thick; the largest extends for 265 ft in the main adit. Sulfides, including pyrite, galena, sphalerite, and chalcopyrite comprise as much as 20% of the zones.	One 300 ft main adit, one caved adit, one caved shaft, and five cuts and pits over a distance of 1,500 ft.	Twelve samples were collected. Samples from the main zone averaged 4.9 oz/ton silver, 2.4% lead, 2.0% zinc, and trace amounts of copper and gold. The zone contains an inferred 18,400 ton resource (Tuchek and Ridenour, 1981, p. 201).
536	Prospect (T6N, R18E, sec. 11)	Limonite-stained zone in argillite; structure not visible. Quartz vein material on dump is vuggy and contains about 15% sulfides, mostly pyrite and galena. Some andesite porphyry float in vicinity.	Partially caved adit 15 ft long.	Select grab sample; trace gold, 5.1 oz/ton silver, 7.56% lead, 1.64% zinc, and 0.04% copper (Tuchek and Ridenour, 1981, p. 218, no. 7).
537	Prospect (T6N, R18E, sec. 11)	A quartz vein as much as 0.5 ft thick is in slate and argillite.	Two small sloughed pits.	Two grab samples; each with 0.1 oz/ton silver (Tuchek and Ridenour, 1981, p. 218, no. 8).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
538	Alto Silver group (T6N, R18E, sec. 14)	A 0.5-ft-thick quartz vein in argillite and interbedded slate strikes N85°E and dips 57°NW. The vein is exposed for 50-75 ft and contains smithsonite and cerussite. Dump material contains about 20% pyrite, 10% galena, and smaller amounts of sphalerite and chalcopyrite (Tuchek and Ridenour, 1981, p. 208).	A 300-ft main adit and small adit just to the west; a cabin and some dozer scrapes are 700 ft to the east. About 41 tons of ore mined between 1944 and 1948 yielded silver, copper, lead, and zinc.	Two select samples from the dump contained as much as 5.4 oz/ton silver, 0.92% lead, and 1.13% zinc (Tuchek and Ridenour, 1981, p. 208).
539	Star 1 (T6N, R18E, sec. 14)	A quartz vein strikes N75°E and dips 25° to 35° SE. in siliceous argillite and interbedded limestone. The vein averages slightly more than 2 ft thick. About 20% of the vein is sulfides including galena, pyrite, sphalerite, and chalcopyrite.	One adit with about 200 ft of workings.	Twelve samples from the vein averaged 4.7 oz/ton silver, 4.40% lead, 1.85% zinc, and 0.13% copper; samples taken represent 500 tons of indicated resources (Tuchek and Ridenour, 1981, p. 203).
540	Purple Spar prospect (T6N, R18E, sec. 12)	A fluorite-bearing fault zone strikes N45°E and dips 70°NW. in interbedded quartzite and argillite. The fault zone is as much as 50 ft wide and contains veins of fluorite in a matrix of chalcedony, quartz, and brecciated country rock. The largest fluorite exposures are 0.5 to 6 ft thick and 1 to 100 ft long.	Several small cuts.	Three samples contained 49% to 95% CaF$_2$. A 1,000-ton fluorite-rich resource is inferred (Tuchek and Ridenour, 1981, p. 203).
541	Anda (Walton Moly) group (T6N, R18E, sec. 13)	Molybdenite-bearing quartz veins are in Tertiary quartz monzonite near a contact with Paleozoic sedimentary rocks. The veins occur with aplite dikes and strike generally N20°-30°W. An upper exposure is about 40 ft long and consists of several veins, one of which is 3 ft thick. Lower exposures total about 170 ft in length.	Three prospect cuts.	Samples from the upper exposure averaged 0.92% MoS$_2$. Eight samples from the north end of the lower exposure averaged 0.21% MoS$_2$; one contained 0.44% MoS$_2$. One sample across the 50-ft wide quartz veinlet zone at the lower exposure south end contained 0.029% MoS$_2$. An inferred 50,000-ton resource contains 0.22% MoS$_2$ (Tuchek and Ridenour, 1981, p. 208).
542	Black Rock mine (T6N, R19E, sec. 7)	Galena, sphalerite, pyrite, and minor chalcopyrite are in a replacement deposit along bedding in argillite. Granitic dikes intrude sedimentary rocks nearby.	An upper adit, once about 100 ft long, is caved. About 40 ft lower is a 150-ft-long adit that failed to crosscut the ore zone. In 1928, 50 tons of ore were mined; average recovery was 5.52 oz/ton silver, 0.23% copper, 11.39% lead, and 6.64% zinc (Tuchek and Ridenour, 1981).	A select sample of quartz and limonite contained 1.3 oz/ton silver, 8.7% lead, 5.92% zinc. and 0.06% antimony (Tuchek and Ridenour, 1981, p. 209).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
543	Giant Quartz 1 (Big Falls Creek) (T6N, R19E, sec. 18)	Wolframite is in a quartz vein in dark, limonitic argillite of the Phi Kappa Formation just above a contact with intrusive quartz monzonite. The vein is as much as 8 ft thick.	One 140-ft-long adit, several pits.	Five samples ranging from 0.1 to 0.5 oz/ton silver and 0.06% to 0.40% WO_3. Three of the samples contained a trace of gold, one contained 0.5 oz/ton gold (Tuchek and Ridenour, 1981, p. 219, no. 11).
544	White Elephant (Dewey) group (T6N, R18E, sec. 13)	Quartz vein dipping gently to the west in argillite and slate near quartz monzonite stock. Several small stringers of quartz in country rock. Scheelite occurs as small (1/16 in.) disseminated crystals mainly in fractures in the igneous rock near its contact with the sedimentary strata (Tuchek and Ridenour, 1981, p. 219).	Two adits and several small cuts. In 1943, a small tonnage of ore containing 3.38% WO_3 was reportedly shipped from the property (USBM, 1988).	Two samples: no detectable gold or silver (Tuchek and Ridenour, 1981, p. 219, no. 11).
545	Prospect (T6N, R19E, sec. 9)	Light gray, limonite-stained rhyolite porphyry dike intrudes black carbonaceous argillite. The dike strikes N85°W, dips 60°NE, and is 8.5 ft thick.	Two trenches.	Two samples across the dike; one contained 0.2 oz/ton silver and trace copper, lead, and molybdenum (Tuchek and Ridenour, 1981, p. 219, no. 15).
546	Basin Group prospect (T6N, R18E, sec. 24)	Galena, pyrite, chalcopyrite, sphalerite, and pyrrhotite occur in garnet-epidote skarn in calcareous slate and clayey quartzite near a contact with monzonite. Wollastonite, diopside, augite, and fluorite are also present.	One 70-ft adit and several small pits (Umpleby and others, 1930, p. 206).	No data.
547	Sum (T6N, R18E, sec. 25) Andrew Freese	Gossan zone in quartzite contains pyrite and galena and trends northwest.	One 150-ft-long dozer trench, one pit.	Five samples contained trace gold and as much as 0.8 oz/ton silver, 0.8% lead, and 0.11% zinc (Tuchek and Ridenour, 1981, p. 219, no. 19).
548	Prospect (T6N, R18E, sec. 25)	Gossan zone in quartzite, as much as 4 ft thick, contains fine-grained pyrite and galena.	One inclined shaft.	Three samples contained no gold or silver (Tuchek and Ridenour, 1981, p. 219, no. 19).
549	Big Joe-Lost Summer (White Mtn) group (T6N, R19E, sec. 19)	Narrow quartz veins in quartz monzonite near a contact with argillite range from 2 to 6 in. thick, average 50 ft long, and are 10 to 25 ft apart. These veins are found in a zone about 250 ft wide. Molybdenite occurs as widely scattered crystals in quartz; crystals are as large as one-half inch in diameter.	Two pits.	Four samples: two samples from quartz veins averaged 0.38% molybdenum and trace copper and lead; two random chip samples of quartz monzonite contained trace copper, lead, and molybdenum (Tuchek and Ridenour, 1981, p. 219, no. 18).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
550	Phi Kappa mine (T6N, R19E, sec. 21) Ivan Taylor	A diopside-grossularite skarn zone with as much as 15% sulfides is in a limestone bed in the calcareous upper half of a Paleozoic argillite-slate-limestone series. Rhyolite and diabase transect the strata; quartz monzonite was emplaced nearby. Sulfides include galena, sphalerite, pyrite, and chalcopyrite. The main zone is more than 4,000 ft long and averages 4 ft thick (Tuchek and Ridenour, 1981, p. 197).	Underground development in the main workings (six adits) totals more than 4,200 ft of drifts, crosscuts, and stopes; numerous cuts, shallow shafts, and pits are also present. Production between 1926 and 1981 totalled 32,912 tons, yielding 35 oz gold, 53,537 oz silver, 118,268 lb copper, 1,017,889 lb lead, and 846,910 lb zinc (USBM, 1988).	Ninety-five samples from the main zone averaged 3.20 oz/ton silver, 3.35% lead, 3.48% zinc, and 0.08% copper which approximates the grade of 55,000 tons of measured reserves and 1.6 million tons of indicated reserves in the zone (Tuchek and Ridenour, 1981, p. 197). Thirty- four samples from other zones ranged from 0.02 to 23.9 oz/ton silver, 0.01% to 6.43% lead, and 0.01% to 10.3% zinc, and nil to 0.01 oz/ton gold.
551	Silver Dew (T6N, R19E, sec. 28)	A west-trending, steeply dipping shear zone is filled with quartz and breccia. Country rock is argillite and sandy mudstone. The zone is exposed at the surface for 400 ft and averages 3 ft thick.	Four adits on two levels: three upper adits total less than 100 ft in length, the lower adit is inaccessible but was approximately 500 ft long.	Two grab samples contained 1.0 and 0.7 oz/ton silver, 1.70% and 2.42% lead, and 3.86% and 2.32% zinc. Three chip samples contained a trace to 0.3 oz/ton silver. A resource of 20,000 tons is inferred (no grade reported, Tuchek and Ridenour, 1981, p. 212).
552	Quanta (Lodgepole) group (T6N, R19E, sec. 26)	A quartz-filled shear zone, striking N20° to 25°E. and dipping 60° to 80°NW. is discontinuously exposed for one-fourth mile. The zone is as much as 30 ft thick and averages 3 ft thick. Country rocks are calcareous and siliceous argillite with interbedded slate and quartzite (Tuchek and Ridenour, 1981, p. 220).	Two adits totaling 315 ft, one 50-ft-deep shaft, and seven pits.	Fifteen samples; averaged 1.1 oz/ton silver, 0.47% zinc, and 0.03% copper (Tuchek and Ridenour, 1981, p. 220, no. 21).
553	Prospect (T6N, R19E, sec. 34)	A gossan zone 50 ft wide contains a quartz vein as much as 1 ft thick.	Two sloughed pits.	One grab sample contained 0.04 oz/ton gold, trace silver (Tuchek and Ridenour, 1981, p. 220, no. 22).
554	Gravel pit (T7N, R20E, sec. 33)	Granitic sand and gravel (alluvium).	Pit.	Good quality riprap; 8,000 yd^3 identified (USFS, 1988).
555	Prospect (T6N, R20E, sec. 29)	Clayey, limonite-stained contact zones between a dike and argillite. The contact zones range from 0.5 to 2.0 ft thick.	One 170-ft-long adit.	Three samples from contact zones; trace metal values (Tuchek and Ridenour, 1981, p. 220, no. 23).
556	Pine Mouse group (T6N, R20E, sec. 32)	A skarn zone in gneiss and schist is intermittently exposed for about 1 mi where numerous granitic dikes and bodies have intruded. Scheelite is disseminated in the zones which are 2 to 6 ft thick.	No data.	Ten samples contained less than 0.02% to 1.68% WO_3 and averaged 0.32%. At least 1.4 million tons of scheelite-bearing skarn is inferred in a 3,500-ft-long, 5-ft-thick zone (Tuchek and Ridenour, 1981, p. 214).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
557	Wildhorse (T5N, R20E, sec. 5) Willalijack Mining Co. (Brooks)	Scheelite-bearing lenses and pods of skarn are in a well-defined marbleized bed within quartzite and gneiss. The pods are related to aplite and alaskite dikes. Drilling on the Steep Climb claims indicates the bed is discontinuously mineralized for at least 1,300 ft along strike and to a depth of 700 ft. Average thickness is about 2 ft. Beryllium-bearing idocrase also occurs in the skarn zones.	Steep Climb claims: two adits total 1,135 ft in length, three pits; Beaver claims: two open pits; Hard to Find claims: two open pits. Eleven holes totalling 4,724 ft were drilled on the Steep Climb claims in 1982; two holes totalling 205 ft were drilled on Hard to Find in 1985. About 12,000 tons of ore from the three groups of workings were mined between 1954 and 1957. Simons (1981, p. 168) reported total production of 7,461 STU WO_3 (149,220 lb WO_3).	Six 1982 drill holes hit mineralized intercepts that averaged 1.8 ft thick; 32 samples averaged 0.6% to 0.7% WO_3. Hollingsworth (1983) inferred a 200,000 ton resource with 0.70% WO_3 on the Steep Climb claims and a 100,000 ton resource with 0.60% WO_3 on the Hard to Find claims.
558	Topsey group (T5N, R20E, sec. 8)	A northwest-trending skarn zone in schist and gneiss is exposed intermittently for more than 2 mi. The rocks are intruded by numerous granitic and aplitic dikes. Exposures are 8 to 115 ft long and 3 to 13 ft thick, averaging 6 ft. Scheelite is sparsely disseminated in the zone.	None.	Eleven samples contained less than 0.02% to 4.3% WO_3 and averaged 0.15%. Three samples contained 0.3 to 1.2 oz/ton silver, 0.8% to 2.6% lead, and 0.9% to 4.2% zinc; one contained 0.01 oz/ton gold (Tuchek and Ridenour, 1981, p. 214).
559	Sir Rocko 1-2 (T5N, R20E, sec. 17)	A shear zone with well-defined walls and erratic lenses of molybdenite-bearing quartz is in banded granite gneiss. The shear zone strikes N80°-85°W, dips 70°S to vertical and has an exposed strike length of 210 ft and vertical exposure of 180 ft. Quartz-filled portions of the shear zone range from 1 to 7 ft thick. Molybdenite is sparsely disseminated throughout the quartz and sporadically concentrated in a 1- to 2-in.-thick zone along the footwall, hanging wall, or both.	One trench.	Five samples across the shear zone and quartz; trace molybdenum and other metallics (Tuchek and Ridenour, 1981, p. 220, no. 26).
560	Prospect (T6N, R21E, sec. 32)	A series of narrow, pyritized shear zones are in granodiorite. The shear zones strike N55°-60°E and dip 35°NW. The granodiorite between the shear zones has been silicified and limonite stained. The sheared area is 11 ft thick, 10 ft wide, and 30 ft long. The pyritized shear zones are 1 to 3 ft apart and average 2 in. thick.	One adit, 15 ft long.	Two samples; trace gold and 0.5 oz/ton silver (Tuchek and Ridenour, 1981, p. 290, no. 28).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
561	Ajax group (T6N, R21E, sec. 33)	An altered, brecciated zone is in quartzite near a granodiorite contact. The zone trends N60°E and dips 50°SE and is conformable with the quartzite country rock. The zone is irregular and ranges from 6 to 10 ft thick and is exposed for about 160 ft along strike, is heavily limonite stained, and in places contains pods of pyrite. Narrow cross fractures are in places filled with galena.	Three pits, one caved incline shaft, and one caved adit.	Five samples across the zone; as much as 2.4 oz/ton silver and 0.99% lead (Tuchek and Ridenour, 1981, p. 290, no. 29).
562	Prospect (T7N, R22E, sec. 15)	Silicified zones in Challis Volcanics trend generally N15°E, dip 75°SE. The zones contain quartz veins to 0.8 ft thick and pyritic zones as much as 13 ft across.	Three caved adits and one shallow shaft; more recent bulldozer cuts were used as drill sites.	A 12-ft chip sample across one silicified zone contained 0.036 oz/ton gold and 4.08 oz/ton silver. A 0.3 ft quartz vein contained 0.009 oz/ton gold and 0.47 oz.ton silver. Four other 1987 USBM samples contained no values of economic interest.
563	Navarre Creek (T7N, R23E, sec. 20) Louis Rukavina	Rhyolite and latite porphyry are locally argillized and silicified. Steeply dipping quartz stringers and lenses of coarse stibnite in the upper workings trend N10°W. Four pyritic zones were identified near the head of the drainage. Limonite-stained conglomeratic layers and bleached zones are in tufaceous rocks near the lower workings, where pods of gypsum are reported (Kilby, 1984, p. 27).	The lower workings consist of four short, sloughed adits and four pits near the junction of the West and Middle Forks of Navarre Creek. The upper workings consist of three adits about 12, 60, and 130 ft long and a series of bulldozer trenches. Five holes (500 to 750 ft long and totalling 3,100 ft) were drilled in 1981 between the upper and lower workings (Kilby, 1984, p. 19). About 3,508 lb of antimony were produced from the upper workings in 1970 (L. Rukavina, personal commun., 1987).	Areas of intense hydrothermal alteration showed anomalous levels of arsenic, antimony, and silver in geochemical surveys conducted from 1980 through 1983 (Kilby, 1984). Of nine 1987 USBM samples, one sample from quartz stringers in bleached andesite above the upper adits contained 0.004 oz/ton gold and 0.29 oz/ton silver. As well as 27.1% antimony, a sample from a stibnite pod also contained elevated mercury (31 ppm). Three other samples contained elevated levels of arsenic (100 to 270 ppm).
564	Prospect (T7N, R23E, sec. 23)	Nelson and Ross (1969) show White Knob Limestone.	Open pit shown on Idaho Falls 1° x 2° quad. (U.S. Geological Survey, 1981).	Unverified, no data.
565	Silver Gem (T7N, R23E, sec. 23) Donald Anderson	Galena and cerussite are in collapse breccia in limestone and along sheared contacts with argillized rhyolite porphyry. Cavern deposits include highly polished, water-worn(?) pebbles 0.2 to 0.8 in. across.	At least five caved or partly caved adits, four open adits 30 to 110 ft long, and numerous pits and open cuts are on the claims. Stoping in at least one adit suggests some production.	Four 1987 USBM samples contained 3.38 to 15.34 oz/ton silver, 0.001 to 0.053 oz/ton gold, and 2.84% to 27.4 1% lead; two contained 1.39% and 3.99% zinc.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
566	Doughboy mine (Veteran) (T7N, R23E, sec. 26) Donald Anderson	Pods of galena, tetrahedrite, and arsenopyrite are along shear zones in limestone (D. Anderson, personal commun., 1987).	One shaft 370 ft deep (caved) with 1,500 ft of drifting, one short adit, and one pit. Between 1919 and 1968, 1,070 tons of ore yielded 31,703 oz silver, 637,120 lb lead, 3,900 lb zinc, 8.3 oz gold, and 1,972 lb copper.	One 1987 USBM sample from a newly discovered vein contained 4.38 oz/ton silver, 8.80% lead, and 3.61% zinc.
567	Kenneth Wayne (T7N, R23E, sec. 26) Donald Anderson	Skarn zones are along contacts of White Knob Limestone with Tertiary quartz monzonite. Gossans and jasperoids associated with rhyolite dikes suggest epithermal mineralization.	Eight adits and nine pits are shown on topographic maps. One adit 360 ft long was rehabilitated; eight holes 280 to 600 ft deep and totalling 3,000 ft were drilled by Nicor Mineral Ventures, Inc. in 1984 (USFS, 1988). Other adits are caved.	Surface geochemical sampling from 1982 to 1984 contained 5 ppm to 24.1% lead, 20 ppm to 9.25% zinc, less than 0.05 to 0.266 oz/ton gold, less than 0.1 to 2.07 oz/ton silver, 6 ppm to 1.95% copper, and 1 to 30 ppm tungsten. One drill hole intercepted 10 ft of 0.037 oz/ton gold but no similar values were found in the nearby adit (USFS, 1988).
568	MK claims (T7N, R23E, sec. 25) Nicor Mineral Ventures	Mississippian limestone is cut by rhyolite dikes.	Four adits and two pits.	No data.
569	Silver King group (T7N, R23E, sec. 25) Donald Anderson	Mississippian limestone intruded by rhyolite and quartz latite dikes.	Five adits and five pits.	No data.
570	Black Daisy (Kennedy) group (T7N, R23E, sec. 35) Donald Anderson	Mineralized shear zones and lenses of garnet-magnetite skarn are along or near granite-limestone contacts. The zones are 1.5 to 8.0 ft thick and contain scattered galena, arsenopyrite, scheelite, pyrite, and chrysocolla.	At least thirteen adits and six shafts, as well as numerous pits are on the claims. Two adits sampled were about 170 and 370 ft long, most others are at least partly caved (Umpleby, 1917, p. 103). USBM records show production of 299 tons between 1907 and 1979 yielding 2,669 oz silver, 46,137 lb lead, 2.9 oz gold, 334 lb copper, and 65 lb zinc. About 150 tons of tungsten ore have been mined (D. Anderson, personal commun., 1987).	Eight 1987 USBM samples contained 0.01 to 6.44 oz/ton silver; two contained 1.92% and 6.33% copper; four contained 2.51% to 11.8% lead; and six contained 1.22% to 7.09% zinc. One sample contained 0.0455% tungsten; the remainder 0.01% or less.
571	Prospect (T7N, R23E, sec. 33)	Nelson and Ross (1969) show White Knob Limestone.	One adit and one pit shown on topographic map (USGS, 1960).	No data.

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
572	Horseshoe mine (T7N, R23E, sec. 35) Ivan Taylor	Vein-like sulfide replacements and related oxides are in Mississippian limestone along a contact with granite porphyry (Nelson and Ross, 1968, p. 24). Ore contains galena, pyrite, pyrrhotite, sphalerite (marmatite), galena, and chalcopyrite along with cerussite and hemimorphite in a gangue of chert and calcite. Replacement bodies are 15 to 20 ft wide and as much as 60 ft long.	Two mostly caved adits have about 875 ft and 1,225 ft of workings. A 350 ft vertical shaft provides access to four lower levels that total 1,500 ft of workings (Nickelson, 1955). A new lower level adit was driven 2,400 ft between 1968 and 1972, exposing ore that was partially mined and processed in the mill at the Empire mine where the concentrates remain. Production from 1916 through 19718 totalled 149,461 oz silver, 37,350 lb copper, 4,186,963 lb lead, 446,014 lb zinc, and 107.89 oz gold from 13,916 tons mined (Nelson and Ross, 1968, p. 30; USBM, 1988). About 2,900 tons of ore averaging 3.8% copper and 12% zinc were milled at the Empire mill in 1979 (I, Taylor, written commun, 1988).	Concentration tests were run on material that contained 1.0% lead, 7.1% zinc, 2.3 oz/ton silver, 0.82% copper, and 0.01 oz/ton gold (Nickelson, 1955). The partly mined sulfide ore body exposed by recent development contains 12% to 14% zinc, 5% to 6% lead and 0.7 to 1 oz/ton silver (I. Taylor, personal commun., 1987).
573	White Knob mine (T7N, R23E, sec. 36)	A skarn zone is along the contact of limestone with intruding rhyolite porphyry. The zone trends to the west and dips steeply south. Ore consists of oxides of lead and zinc, including cerussite, hemimorphite, and smithsonite in a limonitic matrix, with small amounts of galena.	A glory hole and four adits 150, 500, 550, and 1700 ft long were largely caved in 1943; a 200 ft vertical shaft with two levels totalling 965 ft was also mostly inaccessible. Between 1928 and 1968, metals produced included silver, lead, zinc, copper, and gold (USBM, 1988).	Ninety near-surface samples averaged 0.52 oz/ton silver, 0.29% lead, 17.6% zinc, 0.12% copper, and a trace of gold. The samples represent a zone 10 ft wide, 25 to 75 ft deep, and 300 ft long (USBM, 1988). Two 1987 USBM samples of high grade oxide ore from the glory hole contained 23.3% and 17.9% lead and 15.48 and 15.70 oz/ton silver; one sample contained 26.5% zinc.
574	Blue Bird (Easlie) mine (T7N, R23E, sec. 36)	Mineralized contacts between limestone and intrusive rocks were explored for lead and silver (Nelson and Ross, 1968, p. 27).	One shaft was at least 100 ft deep, several pits and short adits (Umpleby, 1917, p. 103). USBM records show production of lead, silver, gold, copper, and zinc between 1924 and 1939.	Production suggests that mined ore averaged 16% lead and 10.7 oz/ton silver.
575	Tiger group (T7N, R23E, sec. 36)	Three limestone blocks engulfed in granitic rock are mineralized around their margins. Secondary copper minerals are in garnet skarn bodies.	Several small adits, numerous shallow open cuts, and a shaft 35 ft deep. Two cars of ore were shipped in 1912 (Umpleby, 1917, p. 101).	Production suggests ore contained 0.105 oz/ton gold, 2 oz/ton silver, and 0.06% copper (USBM, 1988).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
576	Empire mine (T7N, R23E, sec. 36) Honolulu Copper Co., and Myko Resources.	Garnet-diopside skarn zones are along the margin of a granite stock that intruded Mississippian limestone. The skarn contains chalcopyrite accompanied by pyrite, pyrrhotite, calcite, and quartz with lesser amounts of magnetite, fluorite, sphalerite, molybdenite, scheelite and specular hematite. Pipe-like ore bodies are in an arcuate belt about 3 mi long and 1,000 ft wide.	Eight major levels contain more than 60,000 ft of horizontal workings. The first mining was by surface methods on ore bodies at the southern end of the property. The main portal is at the 700 level; a 330 ft interior shaft connects with lower levels. Workings are in an arcuate zone 3,500 ft long and about 400 ft wide. Mining has been mainly by shrinkage stoping but some stopes are square-set. A mill was built in 1961 at the 1100 level and mining was done in old stopes through 1965 (Collins and others, 1967, p. 275). The deposit was drilled in the 1970's and leaching recovery from oxidized ore was tested. Between 1901 and 1942, about 55,630,493 lb copper, 1,202,459 oz silver, and 36,925.59 oz gold were produced from 765,087 tons of crude ore and 17,766 tons of concentrates (Nelson and Ross, 1968, p. 29). In addition, 55 tons of ore with 2.08% WO_3 were produced in 1942 (Cook, 1956, p. 28). Since 1942, an additional 144,424 tons of ore have added substantially to these totals (USBM, 1988); the last recorded production was in 1982.	Indicated and inferred resources of 23,370 tons averaging 2.67% copper, 0.066 oz/ton gold, and 0.95 oz/ton silver were estimated by Farwell and Full (1944, p. 15). A 3.5-million-ton identified resource contains 0.65% leachable copper (0.4% cutoff); as much as 10 million tons may be present (I. Taylor, personal commun., 1987).
577	Saddle (Ausich-Barton) (T6N, R23E, sec. 1) Joseph Ausich	A skarn deposit in Mississippian limestone, associated with a Tertiary granite stock, contains massive magnetite. The deposit is immediately south of copper deposits of the Empire mine and contains some chrysocolla and malachite.	The deposit is exposed in open cuts. Mapping, drilling, and bulldozer trenching were done in 1959, and about 6,000 tons of iron ore for use as heavy aggregate was produced in 1961 (J. Ausich, personal commun., 1987).	One 1987 USBM sample from a dump stockpile contained 2.91 oz/ton silver and more than 1% copper. The main magnetite body is 1,000 ft long, more than 300 ft wide, and more than 100 ft thick (Soregaroli and others, 1974). A resource of 10 million long tons of iron ore (>50% Fe) was delimited by 1959 drilling (J. Ausich, personal commun., 1987).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
578	Grand Prize (T6N, R23E, sec. 1) Joseph Ausich	A near-vertical vein of argentiferous galena, chalcopyrite, and subordinate sphalerite strikes N5° to 10°E in skarn at a contact of limestone with granite. Siderite or iron-bearing calcite and fluorite are the principle gangue minerals. The sulfides are, in places, altered to lead and copper carbonates; manganese oxides are common. The vein is 5 to 8 ft thick in the Grand Prize shaft and may extend for 1,300 ft to the northwest where a similar vein was intersected in the Darlington shaft of the Empire mine group (Umpleby, 1917, p. 101). Copper and tungsten are also reported.	Two shafts (130 and 55 ft deep) with several levels and an adit with 200 ft of workings are largely caved. Several trenches and pits are nearby. Lead ore also containing 8 oz/ton silver was mined during sinking of the discovery shaft (before 1893) yielded returns of about $10,000 (Umpleby, 1917, p. 101). Small shipments of ore from dumps were made from 1938 through 1943 (Sharp, 1977, p. 6). Drilling of one core hole was proposed for 1982.	Samples collected when parts of the vein were exposed in 1938 averaged 0.015 oz/ton gold, 78.9 oz/ton silver, 19.8% lead, and 4.3% copper (Sharp, 1977, p. 9). A 1987 USBM sample from the collar of the shaft contained 1.75 oz/ton silver and 4.05% zinc. Sharp (1977) estimated resources of 3,000 tons per 100 vertical feet below the discovery shaft that might average 0.01 oz/ton gold, 52.6 oz/ton silver, 13.2% lead, and 4.3% copper.
579	Copper Queen mine (T6N, R23E, sec. 4)	Zones of garnet-magnetite skarn 3 to 8 ft thick are along a granite-marble contact that strikes north and dips 45° to 65°E. Chalcopyrite, malachite, and scheelite are in the skarn zones, with sparse amounts of galena, and cerussite (Parsons and Nickelson, 1956).	Three adits with at least 400 ft of underground workings, and several pits and bulldozer trenches.	Six 1956 USBM samples averaged 0.59 oz/ton silver, and 0.27% copper. One sample contained 4.4% lead; one contained 1.0% lead and 1.6% zinc; and one contained 1.0% zinc. Two contained a trace of gold (Parsons and Nickelson, 1956).
580	Silver and Lead Bell (Hanni) (T6N, R23E, sec. 3) Donald Hanni	A skarn zone about 20 ft wide is along a contact of granite with silicified limestone. The contact strikes N25°W and dips 55°SW. Scheelite is in cross fractures within the zone. Argentiferous galena and secondary lead, silver, and copper minerals are also in the zone	Two caved adits totalled 300 ft in length; a shaft was inaccessible in 1950. USBM records show production in 1951-2 that yielded silver, lead, zinc, and copper. An 11-ton shipment of ore that contained 1.60% WO_3 was mined in 1953 (Cook, 1956, p. 29).	A 2.5 ft-thick segment of the zone contained 0.13% WO_3 (USBM, 1988).
581	Phoenix mine (T6N, R23E, sec. 3) Joseph Ausich	Scheelite-bearing skarn is along a contact of granite and Paleozoic limestone (Cook, 1956, p. 27). Scheelite and molybdenite are concentrated in northeast-trending, steeply northwest-dipping shear zones. Small pods of malachite and chrysocolla are also in the mineralized skarn which is exposed for about 150 ft underground.	One adit with about 440 ft of workings, two pits.	Two samples across the mineralized zone (38 ft and 20 ft long) contained 0.80% and 0.75% WO_3, respectively (J. Ausich, written commun., 1983).
582	Mammoth (Mildred) mine (T6N, R23E, sec. 4) Donald Hanni	Garnet-epidote-magnetite skarn zone along a granite-limestone contact contains disseminated pyrite and locally galena and malachite. The zone is reportedly 150 ft long and 6 ft wide (Leland, 1957, p. 64).	One 42-ft adit, one 25-ft inclined shaft, and at least five caved adits and five pits. The remains of a stamp mill suggest past production.	Five 1987 USBM samples from the zone contained 0.05 to 1.46 oz/ton silver; one contained 1.44% copper and one contained 1.71% lead and 23.3% zinc. Tungsten in four samples ranged from 0.0055% to 0.0115%.

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
583	Red Sky (T6N, R23E, sec. 10) K. West	A series of northeast-trending rhyolite dikes in Mackay granite are near a limestone contact. A pod of magnetite is reported.	An open cut is proposed in an approved plan of operation to explore beneath the magnetite pod (USFS, 1988).	No data.
584	One and Only One prospect (T6N, R23E, sec. 12)	A skarn zone at the contact of Paleozoic limestone with Tertiary granite contains powellite, scheelite, malachite, magnetite, garnet, and limonite. The zone strikes N72°E and averages 8 ft thick but is poorly exposed at the surface.	One 40 ft adit, and a 40 ft winze.	Seven samples collected from the deposit in 1953 and 1954 averaged 0.32% WO_3, six averaged 0.04% molybdenum, and four averaged 0.27 oz/ton silver (USBM, 1988).
585	Vaught (T6N, R23E, sec. 12)	Garnet skarn along a mineralized contact zone between granite and limestone contains relatively abundant powellite.	Workings "extend over 200 feet into the hillside" (Cook, 1956, p. 28).	Two samples contained 0.08% and 0.30% WO_3 and 0.044% and 0.049% molybdenum (Cook, 1956, p. 28).
586	Champion mine (T6N, R23E, sec. 12) Joseph Ausich	A brecciated and sheared zone along bedding in Mississippian limestone strikes north and dips 60° to 70°W. The zone is at a contact with a granitic stock, and consists mainly of cerussite with other secondary lead, zinc, and silver minerals. Remnants of galena are sparse. The zone is exposed for 1,400 ft in outcrop and is 6 to 40 ft wide at depth (Taber, 1944).	Workings on three levels total about 3,032 ft of drifts, crosscuts, raises, and winzes. Production between 1937 and 1970 totalled 2,707.52 tons with an average content of 12.3% lead, 2.8% zinc, 2.76 oz/ton silver, 0.0069 oz/ton gold, and 0.3% copper (J. Ausich, written commun., 1987).	A sample submitted for metallurgical testing contained 2.8% lead, 3.65% zinc, 0.30% copper, 0.7 oz/ton silver, and a trace of gold. Indicated resources between the upper two levels, totalling about 40,000 tons containing 4.2% Pb, 4.3% Zn, and 0.93 oz/ton Ag, were estimated by Taber (1944).
587	Harry Aune prospect (T6N, R23E, sec. 14)	Short, narrow bodies of skarn are along a granite-marble contact (Leland, 1957, p. 61).	One adit, two shafts, and six pits.	The skarn contains traces of copper. One 1987 USBM sample contained 3.27 oz/ton silver, 9.35% lead, and 2.92% zinc.
588	Puzzler prospect (T6N, R23E, sec. 13)	A shear zone in limestone near a contact with granite contains lead and zinc.	Maps show one shaft, four adits, and two pits. In 1937, 64 tons of ore from the shaft contained about 12.5% lead and 1.0% zinc (Leland, 1957, p. 60).	No data
589	Joan (T6N, R23E, sec. 14) (Tom O'Dell)	Garnet-epidote-quartz skarn in limestone contains bladed barite, arsenopyrite, small amounts of secondary copper minerals, and pods of manganese oxides along with banded siderite and calcite.	Four adits (one caved, one flooded, others 51 and 72 ft long), two pits, and two shallow shafts.	A 1987 USBM grab sample from the dump of the uppermost adit contained 0.56 oz/ton silver, 0.76% tungsten, and 1.33% lead; a second sample contained no significant mineral concentrations.
590	Royal Ruby Silver (T6N, R23E, sec. 15)	A garnet-magnetite skarn zone with limonite boxworks is along a limestone-granite contact.	Two caved adits and two short open adits.	A 1987 USBM grab sample of skarn from the dump of a lower caved adit contained 0.06 oz/ton silver; a chip sample from an upper adit contained 0.15 oz/ton silver.

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
591	George Washington 1-4 (T6N, R23E, sec. 15) Donald Hanni	Skarn zones along a northwest-trending contact of granitic rocks with White Knob Limestone contain anglesite and cerussite with secondary zinc and copper minerals.	A 65-ft-deep shaft on the ridge top produced a small tonnage of ore in 1949 that averaged 4 oz/ton silver, 0.0035% copper, and 0.12% lead. A 500-ft crosscut transects the limestone-granite contact. Several pits and trenches are nearby.	A 1987 USBM outcrop sample of skarn from near the crosscut contained no significant metals. A grab sample of stockpile material from near the shaft contained 2.8 oz/ton silver, 9.11% lead, and 7.93% zinc.
592	Prospect (T6N, R23E, sec. 16)	Nelson and Ross (1969) show granitic rock of the Mackay stock.	One pit shown on topographic map (USGS, 1960).	No data.
593	Prospect (T6N, R23E, sec. 16)	Epidote-garnet skarn along a granite-limestone contact contains disseminated pyrite and arsenopyrite. The skarn zone extends at least 80 ft along a trend of to N15°E and ranges from 0.3 to 8 ft thick.	One 5-ft-deep pit.	One 1987 USBM chip sample from the zone contained no economically significant mineral values.
594	Copper Basin mine (T6N, R22E, sec. 34)	Paleozoic quartzite and limestone are intruded by dikes of granitic and andesitic porphyry and aplite. Oxidized replacement deposits in tabular bodies and irregular pods contain limonite, chrysocolla, azurite, and malachite with magnetite, garnet and diopside. Mineralized zones are partly bedding controlled; beds strike about N20°E and dip 10° to 30°SE (Umpleby, 1917, p. 104).	Five adits and a 265 ft shaft have about 3,000 ft of underground workings. The property was drilled by Utah International, Inc. in 1981 and by Westgold in 1988. About $230,000 was produced between the 1880's and 1930 (Ross, 1930, p. 10) in copper, silver, gold, and lead.	Six samples from an irregular zone along a quartzite-intrusive contact contained 0.13% to 3.0% copper, averaging 1.03% (Farwell, 1943). Five of eight earlier samples contained 1.0 to 7.0 oz/ton silver and 0.02 to 0.08 oz/ton gold (Shaffer, 1942). One sample from a tabular body along bedding contained 1.17% copper, 0.90 oz/ton silver, and a trace of gold; a sulfide zone or a zone of secondary enrichment may be present below the low-grade oxidized material (Farwell, 1943).
595	Anderson prospect (T6N, R22E, sec. 34)	An oxidized vein in slate and quartzite is 0.5 to 2 ft thick.	One adit, one pit.	Stockpiled material averaged 20% copper, 30 oz/ton silver, and $3.50 (about 0.17 oz/ton) in gold (Umpleby, 1917, p. 105).
596	Rosenkranze mine (T6N, R22E, sec. 34)	Oxidized, tabular replacement zones are in slate and quartzite.	Four principle adits. Some ore was shipped before 1917 (Umpleby, 1917, p. 105).	No data.
597	Prospect (T5N, R24E, sec. 1)	Nelson and Ross (1969) have mapped Challis Volcanics in the area. Jasperoids are shown in limestone just to the east.	One adit or cave.	No data; geochemical associations in samples of nearby jasperoid bodies suggest possible low-grade gold mineralization (Wilson and others, 1988).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
598	Prospect (T5N, R22E, sec. 17)	A 4-ft-thick, north-trending, shattered zone 50 ft long and two northeast-trending shears are in pink to light gray, limy argillite. The shattered zone is silicified and contains stringers of calcite.	One adit, 120 ft long.	Four samples: one sample from a 2-ft-thick shear zone contained trace gold, 0.7 oz/ton silver, 8.40% lead, and 6.89% zinc. Three other samples zones averaged trace gold, 0.2 oz/ton silver, 0.43% lead, and 0.89% zinc (Tuchek and Ridenour, 1981, p. 291, No. 34).
599	Gravel pit (T5N, R21E, sec. 23)	Terrace gravels (Rember and Bennett, 1979); volcanic rock with some granitics.	Open cut.	Good quality fill and surfacing gravel; 6,250 yd^3 identified (USFS, 1988).
600	Upper Lake Creek (T5N, R22E, sec. 27)	Tertiary plutonic rocks; unverified, only general location given (Griner, 1972, p. 74).	Underground, extent unknown; idle in 1971.	No data.
601	Prospect (T5N, R22E, sec. 34)	A milky white to clear quartz vein is in diorite porphyry intrusive. The vein strikes N45°E and dips vertically. It ranges from 0.3 to 0.8 ft thick and is exposed for 50 ft along strike.	One pit.	One sample contained trace amounts of metal values (Tuchek and Ridenour, 1981, p. 291, No. 36).
602	Prospect (T4N, R22E, sec. 3)	Location of the workings indicate a northeast-trending quartz structure in diorite. The structure is not exposed on the surface. Vuggy limonite-stained quartz is on dumps.	Two adits, one caved; and a caved shaft.	One dump sample had 1.6 oz/ton silver and trace amounts of gold, copper, and lead (Tuchek and Ridenour, 1981, p. 291, No. 37).
603	Cornhusker prospect (T4N, R22E, sec. 5)	Shear zones in Paleozoic limestone and argillite are mineralized in lenses as much as 20 ft long and 2.5 ft thick. Galena and cerussite are in narrow discontinuous fractures.	Two adits are 13 and 15 ft long.	A sample from one lens contained 2.2 oz/ton silver, 0.8% lead, 0.05% copper, 1.2% zinc, and a trace of gold (Tuchek and Ridenour, 1981, p. 291, No. 33).
604	Candy Cane group (T4N, R22E, sec. 5)	Metal-bearing, fine-grained silicic and mafic dikes along fractures and fault zones, as much as 3.5 ft thick in limestone and argillite.	Caved adit, estimated 75 ft long, and a small pit.	Four samples: two samples of iron-oxide-stained argillite had trace gold. Two samples from fracture zones had 1.07% and 19.1% copper, one contained 0.85% lead, and 0.002% zinc (Tuchek and Ridenour, 1981, p. 291, No. 33).
605	Gamebet group (T5N, R21E, sec. 34)	Stringers of chrysocolla, malachite, azurite, and sparse chalcopyrite are in quartzite and siliceous limestone near an aplitic dike along with magnetite, garnet, and diopside .	One adit with 156 ft of workings, two trenches, and several shallow cuts. Reported production totalled 60.5 tons of ore that averaged 1.32 oz/ton silver, and 3.95% copper (USBM, 1988).	Three grab samples contained 0.72%, 0.87%, and 11.1% copper. One sample also contained 0.1 oz/ton silver and a trace of gold (USBM, 1988).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
606	Mackinaw group (T4N, R21E, sec. 3)	A mineralized zone along bedding in limestone strikes N35°W and dips 50°NE. The zone averages 4 ft thick and contains stringers and blebs of galena, chalcopyrite, and sphalerite in a gangue of brecciated limestone and quartz. The limestone is in a wedge-shaped block in fault contact with argillite on two sides.	An irregular excavation 20 by 40 ft is the main working; six small adits and pits are also at the deposit. In 1954, 80 tons of ore were produced from which 2.44 oz/ton silver, 5.0% copper, 12.0% lead, and 8.2% zinc were recovered. As much as 300 tons of ore may have been produced (Tuchek and Ridenour, 1981, p. 289).	Three samples from the zone averaged 19.3 oz/ton silver, 7.01% copper, 13.6% lead, and 5.7% zinc (Tuchek and Ridenour, 1981, p. 289).
607	Star Hope mine (T4N, R21E, sec. 11)	Galena, tetrahedrite, and chalcopyrite occur in quartz veins and along fractures across the veins in folded and crumpled Paleozoic sedimentary strata. The rocks consist of carbonaceous argillite and quartzite with limestone interbeds, intruded by rhyolitic and granitic dikes.	Five levels at the mine total about 2,150 ft of underground workings. Umpleby (1917, p. 105) reported $50,000 in lead-silver ore produced. The mine was mostly developed during the 1890's and last worked in 1954 (Tuchek and Ridenour, 1981, p. 288).	Resources may remain, permission to examine was denied (Tuchek and Ridenour, 1981, p. 288).
608	Bent Pine Tree group (T4N, R21E, sec. 10)	Contact alteration zones as much as 5 ft thick in limestone adjacent to porphyry dikes.	Three adits 15, 20, and 30 ft long; one caved adit, estimated to be 20 ft long; and one small pit.	Five samples; four samples across zones averaged trace gold, 0.19 oz/ton silver, 0.08% copper, 0.08% lead, and 0.09% zinc. Grab sample of iron-oxide-stained porphyry; trace gold, 0.5 oz/ton silver, 1.9% copper, 3.36% lead, and 2.6% zinc (Tuchek and Ridenour, 1981, p. 290).
609	Silver Bell (T4N, R22E, sec. 15)	Quartz-filled, brecciated fracture zone as much as 1.5 ft thick dipping from 65°SE. to vertical on a trend of N20°E. Country rock is argillite. The zone locally contains 20% sulfides, chiefly pyrite and galena	Two adits.	Two samples; as much as 5.1 oz/ton silver, 1.94% lead, 0.15% zinc, and trace amounts of gold and copper. (Tuchek and Ridenour, 1981, p. 292, No. 38).
610	Snowball group (T4N, R21E, sec. 24)	Small, weakly mineralized bedding-plane shear zones in limestone with interbedded shale and quartzite. The zones are lightly iron-oxide stained, contain no visible sulfides, and are discontinuous. A few scattered pieces of material are malachite stained.	Two sloughed pits.	One grab sample; 0.7 oz/ton silver, 1.84% lead, 0.08% zinc, and 0.04% copper. (Tuchek and Ridenour, 1981, p. 286, No. 70).
611	Prospect (T4N, R22E, sec. 29)	Limonite-stained andesite porphyry, no ore minerals were visible.	Three shallow bulldozer cuts.	One sample had trace amounts of metal values (Tuchek and Ridenour, 1981, p. 291, No. 39).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
612	Prospect (T4N, R23E, sec. 30)	Sandstone of the Copper Basin Formation (Rember and Bennett, 1979) is silicified along the margin of a quartz porphyry dike.	One caved adit.	Two 1987 USBM samples contained no minerals of economic significance.
613	Prospect (T4N, R23E, sec. 30)	Shale and bog iron in the Copper Basin Formation (Rember and Bennett, 1979).	One adit, one shaft, and three pits.	Three 1988 USBM samples contained 0.3 to 0.8 ppm silver, one contained 5.0 ppb gold, each had less than 0.05% lead, zinc, and copper.
614	Prospect (T4N, R23E, sec. 32)	Copper Basin Formation (Rember and Bennett, 1979).	One pit.	One 1988 USBM sample contained no economically significant mineral concentrations.
615	Lead Belt (Big Dipper) mine (T3N, R23E, sec. 12) I.J. and Edith Monger	Northward-trending veins in Paleozoic limestone dip westward beneath Tertiary andesite. Clots of galena occur irregularly in manganese-stained calcite veins 2 to 3 ft thick.	Two adits and three shafts at the upper, old Lead Belt mine totalled about 2,000 ft of workings, some of which were filled during later open pit operations. At least three short adits, a shaft, and a 260-ft crosscut are at the lower workings. Some high-grade silver-lead ore was shipped in 1908 and 1910. From 1913 through 1941, 1,245 tons of ore were produced that yielded 48 oz gold, 25,798 oz silver, 3,996 lb copper, and 590,207 lb lead.	Four chip samples from across a manganiferous calcite vein contained less than 0.1% lead and zinc; silver was detected in one sample (0.65 oz/ton). Two stockpile samples contained 3.8% and 37.3% lead, 5.0 and 85.75 oz/ton silver, and less than 1.7% zinc (USBM, 1988). A 1987 USBM sample of stockpiled material at the open pit contained 0.047 oz/ton gold, 9.84 oz/ton silver, 6.27% lead, and 1.22% zinc. One of five other samples contained 2.3 oz/ton silver; no other analyses were economically significant.
616	Butte-Antelope (Lowboy) mine (T3N, R23E, sec. 13) C.J. and V.M. Kimball	North-trending calcite veins and stringers dip steeply west in limestone and black shale. The veins contain galena with minor amounts of sphalerite, tetrahedrite, and pyrite. A more-gently dipping replacement body in limestone is thoroughly oxidized.	Old sloughed workings consist of several open cuts and short adits. An adit was extended to about 300 ft in 1928 (portal is at an elevation of 7,250 ft). One early carload of ore was reportedly shipped (Anderson, 1929, p. 69). Latest production is from an open pit on the east side of the creek; a small gravity mill is on the west side. Between 1965 and 1975, 256 tons of ore yielded 1.0 oz gold, 9,185 oz silver, 1,300 lb copper, 23,581 lb lead, and 10,980 lb zinc.	Select samples with galena contained 31 oz/ton silver (Anderson, 1929, p. 70). One sample from an 8-ft wide replacement zone contained a trace of gold, 96.0 oz/ton silver, 12.35% lead, 0.15% copper, and 1.2% zinc (USFS, 1988). One 1987 USBM sample of ball mill feed from the mill contained 0.168 oz/ton gold, 26.5 oz/ton silver, and 4.80% lead. Four other samples contained 0.11 to 1.17 oz/ton silver.
617	Silver Haze (T3N, R23E, sec. 14) Larry Wickland	Geologic maps show Challis Volcanics (Nelson and Ross, 1969).	A single drill hole was proposed for 1984 (USFS, 1988).	No data.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
618	Bonanza (T3N, R23E, sec. 23)	A contact of porphyritic andesite with dark gray shale strikes N15°E and dips 61°SE. The andesite is argillized along the contact, and is limonite stained along fissures.	One caved adit, one pit.	Two 1987 USBM samples from the workings contained no economically significant minerals.
619	Prospect (T3N, R23E, sec. 24)	Paleozoic quartzite and shale reportedly contain galena.	Four adits, one pit; small-scale production reported (Anderson, 1929, p. 70)	No data.
620	Mt. Borah (Ben Lyon) prospect (T10N, R22E, sec. 26)	Galena, sphalerite, and minor barite are in scattered, discontinuous alteration and replacement zones and pipes as much as 4 ft thick in Paleozoic carbonate rocks. The zones trend westerly with dips that approach vertical. The zones are commonly brecciated and limonite stained, and cover an area that extends about 2,000 ft in an easterly direction and is 1,100 ft wide.	One open adit 14 ft long, five caved adits (estimated to be 35, 50, 80, and 175 ft long), one caved shaft, four pits, and one short trench. A few tons of lead and zinc ore may have been shipped prior to 1935 (Ross, 1947, p. 1156).	Seven samples: a trace of gold was found in two samples; silver ranged from 0.1 to 0.4 oz/ton in four; lead ranged from 0.005% to 1.01% in seven, and one sample contained 15.2%; zinc ranged from 0.027% to 1.27% in four samples; barite ranged from 0.12% to 3.7% in three (Capstick and others, 1987, p. 16).
621	Jayrock (T9N, R23E, sec. 29)	A mineralized zone that contains vein quartz and abundant limonite is on the contact between rusty quartzite and dark dolomite. The zone is about 10 ft thick; it strikes N20°E, and dips 70NW (Ross, 1947, p. 1157).	Ross (1947, p. 1157) described a short bench about 3 ft deep; no workings were found in a 1985 search.	No data.
622	Snowshoe (T9N, R23E, sec. 31)	Barite occurs along the contact between an older quartzite and the Kinnikinic Quartzite near Sawmill Gulch. Barite is in discontinuous seams that range from 0.1 to 3 ft thick but are more commonly about 1 ft thick. The seams are exposed in an area of 50 by 50 ft.	One small pit.	Three 1985 USBM samples: one contained 88.4% barite; another from the same locality had a specific gravity of 4.39; the third was 5.3% barite (Capstick and others, 1987, p. 18).
623	Prospect (T8N, R23E, sec. 5)	Barite, quartz, and calcite veins along shear zones in dolomite and quartzite contain small amounts of galena and chalcopyrite. The zones are steeply dipping, as much as 4 ft thick, and commonly trend N70°E. Two sampled barite lenses are 0.8 and 2.3 ft thick and each about 6 ft long.	Two shafts 15 and 30 ft deep, one caved adit, one trench, and seven pits.	Fourteen samples: two chip samples from barite lenses contained 42.5% and 85.0% barite, two grab samples from other sites contained 25.8% and 68.0% barite. All but one sample contained silver ranging from 0.1 to 1.1 oz/ton. Two grab samples contained 10.1% and 14.0% lead; remaining samples were less than 1% lead. The exposures suggest structures that are too discontinuous and erratically mineralized to comprise resources (Capstick and others, 1987, p. 17).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
624	Prospect (T8N, R23E, sec. 5) William Cole	Northwesterly trending shear zones in quartzite are locally limonite stained and contain veinlets of quartz and pods and veinlets of barite. The shear zones are 2 to 4 ft thick and also contain small amounts of pyrite, malachite, and azurite.	Three adits each about 20 ft long, two other caved adits, one 30-ft-deep shaft, and four pits.	Eight samples: one sample contained 0.03 oz/ton gold, three contained silver ranging from 0.3 to 3.1 oz/ton, and none contained more than 0.32% copper. One 4.0-ft chip sample was 48.0% barite (Capstick and others, 1987, p. 17).
625	Prospect (T8N, R23E, sec. 7)	Northwesterly trending shear zones in quartzite and calcareous rock contain veinlets of malachite- and azurite-bearing quartz and pods and veinlets of barite.	Four open adits 20, 35, 54, and 91 ft long, two other adits are caved; one 29-ft- deep shaft, one trench, and one pit.	Seven samples: one select azurite-bearing sample contained 15.5 oz/ton silver, 0.23% copper, and 4.8% barite. Two other samples contained 0.09% and 0.13% copper and 15.0% and 42.0% barite; each contained 0.5 oz/ton silver (Capstick and others, 1987, p. 17).
626	Prospect (T8N, R23E, sec. 4)	Ross (1947) shows the site to be underlain by Paleozoic dolomite and argillite.	No data, shown by Mitchell and others, 1981, no. 391.	No data.
627	Prichett (T8N, R23E, sec. 8)	Vuggy, limonite-stained replacement zones in dolomite and quartzite in places contain quartzose boxworks and stringers of calcite.	Two caved adits, one 20-ft-long inclined shaft, and four pits; the lower, longer adit may have had 300 ft of workings, and may have produced a few tons of ore.	Nine samples: five contained 0.1 to 0.7 oz/ton silver, four contained 0.003% to 0.17% lead, and five contained 0.001% to 0.21% zinc (Capstick, and others, 1987, p. 17).
628	Prospect (T8N, R23E, sec. 8)	Quartz veinlets in quartzite contain blebs of hematite. An irregular limonitic pipe in calcareous rock is exposed in a shaft.	Three adits, each about 10 ft long, one 20-ft deep shaft, and eight pits.	Three of five samples each contained 0.1 oz/ton silver; two contained 0.03% and 0.4% barite (Capstick and others, 1987, p. 17).
629	Upper Cedar Creek (T8N, R23E, sec. 24)	Scattered and discontinuous altered zones are in gray, thick-bedded Jefferson Dolomite. Limonite boxworks and stringers are subparallel to near-horizontal bedding. The altered zones are as much as 8 ft thick and contain calcite seams as much as 2 ft thick.	Four caved adits (estimated to be 40, 150, 250, and 350 ft long), and five small sloughed pits.	Thirteen samples: a trace of gold was found in three samples and 0.1 to 0.2 oz/ton silver in eight. Assays showed no significant base metals (Capstick and others, 1987, p. 17).
630	Massacre Mtn (T9N, R25E, sec. 19)	Irregular fractures in limestone or limey shale are partially lined with calcite, limonitic material, and quartz (Ross, 1947).	Prospect shown by Ross (1947, p. 1157); no workings were found in a 1985 search.	No data.
631	Orion (T9N, R25E, sec. 29)	Jasper outcrops are reported (USFS, 1988). Ross (1947) shows Challis Volcanics in the area of the claims.	A 1984 plan of operations proposed two bulldozer trenches to expose additional, possibly gem-grade jasper (USFS, 1988).	No data.

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
632	Kranovich (T8N, R25E, sec. 20)	Irregular fractures in limestone or limey shale are in part lined with calcite, limonitic material, and quartz (Ross, 1947, p.1157).	Prospect shown by Ross (1947); no workings were found in a 1985 search.	No data.
633	Pass Creek (T7N, R25E, sec. 14)	Limonite-stained vein quartz was found on a dump composed of light greenish-gray, sandy-textured tuff. The quartz suggests a vein at least 1 ft thick.	One caved adit, estimated to have been 90 ft long, was driven about N25°W.	One sample contained 0.1 oz/ton silver (Capstick and others, 1987, p. 18).
634	Elbow Quartz (T7N, R26E, sec. 8) Harold Lambert	Massive, high purity, bedded quartzite.	Small trench.	H. Lambert (personal comm., 1988) reported very large tonnages of 99+% silica quartzite.
635	Prospect (T13N, R25E, sec. 13)	Fractured, limonite-bearing dolomite contains minor calcite.	One prospect pit.	One sample contained no economically significant mineral values (Cather and Rains, 1988, p. 45, No. 17).
636	Roosevelt (T13N, R26E, sec. 18)	A shear zone in white quartzite is exposed for about 100 ft along strike. The zone ranges from about 2 to 15 ft thick where exposed. It contains abundant limonite, subordinate manganese oxides, and angular to rounded fragments of quartzite. Sporadic secondary lead, copper and zinc minerals are also present. The zone strikes about N40°W. and dips from 15° to 35°SW.	One adit with about 175 ft of workings and a small dozer cut. A 500-ft adit is reported; some ore was milled in a three-stamp mill along Smithie Fork (Dow, 1960, p. 3).	Two samples from the zone contained 1.3 and 0.10 oz/ton gold and 0.5 and 0.10 oz/ton silver (Dow, 1960). Of four 1986 USBM chip samples from the adit, two contained 0.042 and 0.002 oz/ton gold, and 0.19 and 0.26 oz/ton silver. All four samples contained small amounts of copper, lead, and zinc. A sample of limonite-stained quartzite from the dozer cut contained 0.02 oz/ton silver. A select sample from the dump contained 1.0% lead, 0.1% copper, and 0.09% zinc. No resources were identified (Cather and Rains, 1988, p. 45, No. 19).
637	Trey (T13N, R26E, sec. 17) Herbert Carlyle	An oxidized, manganese-bearing quartz vein in quartzite strikes to the east. The vein is 2.0 ft thick where it crosses a ridgeline (Dow, 1960, p. 3).	No workings were found in a 1988 search.	One sample from the vein contained 0.11 oz/ton gold and 0.1 oz/ton silver (Dow, 1960, p. 3).
638	Pay Day group (T13N, R26E, sec. 19) Herbert Carlyle	Barite veins in green, altered slightly foliated quartzite strike N80°E and dip 80°SE. The veins are at least 0.5 ft thick in places. Quartzite strikes N75°E and dips 25°SE. Barite is mostly fine-grained, banded, and mixed with hematite and quartz.	An open cut is about 75 ft long, 50 ft wide and 25 ft deep; a partly caved adit is at least 40 ft long. A 1980 plan of operations calls for exploration of the barite veins by backhoe (USFS, 1988).	A small stockpile of good grade barite is at the portal of the adit. A 1988 USBM grab sample contained 0.10 ppm silver, 14 ppm copper, 18 ppm lead, and 21 ppm zinc.

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
639	Oregon group (T13N, R25E, sec. 24)	Shear zones, 0.7 to 1.0 ft thick, in fractured dolomite contain secondary lead and zinc minerals and minor limonite and manganese oxides. The nearly vertical shears strike about N30°E.	Two caved adits and a large open cut; no known production.	Two samples contained 0.03 and 0.04 oz/ton gold, 0.4 and 0.6 oz/ton silver, and 59.0% and 50.4% lead (Dow, 1960). Two 1986 USBM samples from the shear zone contained 6.34% and 1.0% lead and 7.35% and 0.9% zinc; no resources were identified (Cather and Rains, 1988, p. 45, No. 18).
640	Lady May (T13N, R26E, sec. 19) Gold Canyon Mining Co.	A 1.2-ft-thick vertical quartz vein in quartzite strikes to the northeast and contains iron oxides and secondary copper minerals (Dow, 1960, p. 3).	One 200-ft adit, one 40-ft shaft, and multiple bulldozer scrapings and trenches (Dow, 1960, p. 3). Underground workings caved or bulldozed shut. Drilled in 1974 (Griner, 1974, p. 50)	A 1960 sample from the vein contained 0.03 oz/ton gold, 0.3 oz/ton silver, and 1.75% copper (Dow, 1960, p. 3). One 1988 USBM sample contained 1.1 ppm silver, 22 ppm copper, 98 ppm lead, and 56 ppm zinc.
641	Wanda Loy (T12N, R26E, sec. 16) Chet Worthing (1955)	Ruppel and Lopez (1981) show Ordovician quartzite and dolomite in the area. A vein containing magnetite and cerussite and small amounts of calcite and limonite is reportedly 1.2 to 2 ft thick (USBM, 1988).	Two adits are each about 50 ft long; last reported production was in 1947 (USBM, 1988). No workings were found in a 1988 search.	Two 1955 samples from the vein contained 0.04 and 0.02 oz/ton gold, 15.3 and 2.3 oz/ton silver, and 45.4% and 15.8% lead. One contained 0.20% copper; the other 10.3% zinc (USBM, 1988).
642	Lemhi Range (T12N, R27E, sec. 18)	Ordovician and Silurian dolomite is reported (MINOBRAS, 1975, p. 47).	No data	No data
643	Sims Magnetite (Bruce) (T12N, R27E, sec. 18)	Lead-silver occurrences and a large, low-grade copper occurrence associated with magnetite skarn (Umpleby, 1913a, p. 89) are along a granodiorite intrusion into quartzite and dolomite (Ruppel and Lopez, 1981). Haloes of limonitic alteration in dolomite surround pods of black cellular iron oxides.	Several pits and bulldozer trenches. Gold and silver were reportedly produced in 1901 (USBM, 1988).	Three 1988 USBM samples contained 0.1 to 1.8 ppm silver, 102 ppm to 1.47% copper, 11 to 117 ppm lead, and 60 to 550 ppm zinc. One sample contained 1,150 ppb gold.
644	Little Windy (Silverside) group (T12N, R27E, sec. 19) Herbert Carlyle	Pods and lenses of jasperoid and earthy to compact, siliceous limonite are along contacts of Ordovician dolomite with quartzite. Earthy material may contain secondary lead and zinc minerals. The quartzite strikes about N25°W and dips 20°SW; overlying dolomite is commonly overturned (Ruppel and Lopez, 1981) but strikes northwesterly and dips southwesterly.	Several pits; a plan of operations (USFS, 1988) shows a tunnel site at the south end of the workings.	Five 1988 USBM samples contained 26 to 1,000 ppm copper, 8 to 205 ppm lead, 70 to 780 ppm zinc, and 0.1 to 1.1 ppm silver; one sample contained 85 ppm gold and 44% iron.

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
645	Bear Hat (T12N, R26E, sec. 23)	White Ordovician Kinnikinic Quartzite is in thrust fault contact with brown, feldspathic Proterozoic, quartzite of the Gunsight Formation (Ruppel and Lopez, 1981); the quartzites are highly fractured.	A plan of operations (USFS, 1988) calls for a crusher, rod mill, and cyclone concentrator in the area of the Squaw Creek borrow pit, but no work was done.	Copper, gold, and silver are reported (S.J. McGraw, personal commun., 1988). Two 1988 USBM samples contained 0.2 and 0.1 ppm silver, 8 and 12 ppm copper, 156 and 270 ppm lead, and 31 and 70 ppm zinc.
646	Teddy (Medicine) (T12N, R27E, sec. 30)	Northerly trending veins are in flat-lying limestone and quartzite (Umpleby, 1913a, p. 89).	A few hundred feet of workings are reported in three shafts as much as 300 ft deep, three adits, and several pits. Along with the Elizabeth mine, 400 tons of ore were produced that contained 20% lead and 11 oz/ton silver (Umpleby, 1913a, p. 89). USBM records show that about 550 additional tons mined between 1908 and 1917 yielded gold, silver, copper, and lead.	Six 1988 USBM samples contained 0.2 to 5.3 oz/ton silver, averaging 3.0 oz/ton; and 0.001 to 0.022 oz/ton gold, averaging 0.008 oz/ton. Lead content ranged from 0.09% to 17.35%, averaging 7.0%. Both copper and zinc content averaged 1.7%.
647	Elizabeth (Sand Carbonate) (T12N, R27E, sec. 30) Quinton Snook	Northerly trending veins are in flat-lying limestone and quartzite (Umpleby, 1913a, p. 89). Earthy to jasperoidal limonite, cerussite, anglesite, and smithsonite are in pods in dolomite along with quartz and barite.	A few hundred feet of workings are reported (in two shafts, one adit, and several pits) which, along with the Teddy mine, produced 400 tons of ore that contained 20% lead and 11 oz/ton silver (Umpleby, 1913a, p. 89). USBM records show that additional production in 1908 yielded gold, silver, copper, and lead.	Three 1988 USBM samples averaged 2.5 oz/ton silver, 1.3% copper, 7.9% lead, 7.0% zinc, and 0.005 oz/ton gold.
648	Red Warrior (Sunrise) (T12N, R27E, sec. 29) Quinton and Lois Snook	North- to northwest-trending shear zones are at the contact of Jefferson Dolomite with dolomite of the Saturday Mountain Formation. The shear zones dip 49°W to 76°E and are as much as 1.3 ft thick. Numerous north-trending faults transect the sediments near the workings. Mineralized shear zones consist of brecciated, recrystallized dolomite with lead and zinc sulfides and secondary minerals, and stringers of calcite and limonite. Exposures are poor. Stockpiles contain galena, sphalerite, malachite, and limonite with stringers of calcite and quartz (Kuizon and Lipton, 1989).	Upper workings consist of one adit caved at 50 ft, one 90-ft inclined shaft, and five pits. Lower workings consist of one caved adit, one caved shaft, two pits, three trenches, and one open cut 60 ft by 100 ft. Between 1910 and 1941, 155 tons of ore were produced that contained 2 to 18 oz/ton silver, and 11% to 58% lead, with smaller amounts of copper, zinc, and gold (Kuizon and Lipton, 1989).	Of 20 samples, nine contained 1.00% to 28.9% lead, and twelve contained 1.00% to 26.8% zinc. One chip sample contained 14.5 oz/ton silver, and five select and grab samples had 2 to 70.9 oz/ton silver. Six select and grab samples contained 0.02 to 0.15 oz/ton gold. One select sample contained 1.64% copper (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
649	Dividend (Big Smoky) mine (T12N, R27E, sec. 32) John Ansted (California Consolidated Mining Co.)	Jefferson Dolomite intruded by andesite dikes is complexly faulted just east of the trace of the Trail Peak thrust fault. A shear zone with a quartz vein strikes N5°-10°W., dips 62°-75°SW., ranges from 0.5 to 4.0 ft thick, and is exposed for 165 ft underground. Several N60°-70°E-striking vertical shears, 2.0 to 8.0 ft thick are exposed underground along strike for as much as 50 ft. Another shear zone strikes N20°W., dips 40°-90°NE., ranges from 3 to 4 ft thick, and is exposed for 15 ft. The shears contain pockets and stringers of sulfide minerals in brecciated quartz and silicified dolomite.	Two adits, 480 and 100 ft long; two caved adits, one about 100 ft long; one caved shaft; and ten small pits and trenches. Between 1929 and 1937, a small amount of ore was produced that contained as much as 65% lead and more than 200 oz/ton silver (Kuizon and Lipton, 1989).	Eleven chip and four grab samples (Kuizon and Lipton, 1989): the chip samples contained 0.0012% to 1.39% lead, 0.003 to 0.53 oz/ton silver, and 0.01% to 0.18% zinc. The grab samples contained 0.005% to 0.063% lead, 0.003 to 0.36 oz/ton silver, and 0.009% to 0.29% zinc. One chip sample had 15 ppb gold. Three grab samples collected in 1965 by OME contained 0.3% to 8.4% lead, 2.3 to 17.7 oz/ton silver, 0.13% to 0.15% copper, and trace to 0.03 oz/ton gold (Hilpert, 1965).
650	Warm Creek prospect (T11N, R26E, sec. 2)	A 2.0-ft-thick fault zone in argillite of the Precambrian Swauger Formation strikes N85°E and dips 60°NW. Heavily iron-stained fractures and shears apparently do not contain ore minerals (Kuizon and Lipton, 1989).	One pit.	Three chip samples contained no anomalous metal values (Kuizon and Lipton, 1989).
651	Copper Bluff (Bornite, Bell Mtn.) (T11N, R27E, sec. 33)	A northeast-trending shear zone at caved lower workings is along a contact between Kinnikinic Quartzite and dolomite of the Saturday Mountain Formation. The zone is flat-lying and as much as 1.5 ft thick (Umpleby, 1917, p. 113). Ore minerals in the dump material include chrysocolla, chalcocite, malachite, and azurite. Two northeast-trending shear zones at the upper workings contain limonite and secondary copper minerals (Kuizon and Lipton, 1989).	One adit totalling 135 ft of workings, one inclined shaft 36 ft deep, four caved adits, one caved inclined shaft, and several pits and bulldozer scrapings. From 1932 to 1941, almost 20 tons of ore containing as much as 20% copper and 15 oz/ton silver were produced; one ton of ore mined in 1951 contained copper, silver, and lead (Kuizon and Lipton, 1989).	Of 23 samples, one chip from the lower workings contained 0.72% copper, 0.18 oz/ton silver, and 174 ppm lead; a select sample contained 5.08% copper, 0.06% lead, 0.048% zinc, 0.61 oz/ton silver, and 600 ppm lead. Five chip samples from the upper workings contained 0.10% to 7.98% copper; one contained 0.12 oz/ton silver. Two select samples contained 16.3% and 20.8% copper, 0.28 and 0.23 oz/ton silver, 465 and 187 ppm lead, and 460 and 400 ppm zinc (Kuizon and Lipton, 1989).
652	Magpie Springs prospect (T11N, R27E, sec. 32)	A shear zone strikes N10°W and dips 50°NE in Precambrian shale, probably of the Summerhouse Formation. The 1.8 to 3.5 ft-thick zone contains secondary copper and iron minerals along with calcite, and extends for 50 ft along strike and 20 ft down dip.	One 65-ft adit and one 25-ft-long trench.	Two chip samples contained 0.35% and 0.70% copper. One contained 10 ppb gold (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
653	Copper Bell (T11N, R27E, sec. 36)	Sheared, brecciated, heavily iron- oxide-stained zones in Kinnikinic Quartzite and dolomite of the Saturday Mountain Formation are in the upper plate of the Bell Mountain thrust fault.	None.	Three samples: one sample of brecciated quartzite contained 0.075% lead and 0.043% zinc. Each sample contained two to several times the expected background value for lead, zinc, and copper (Kuizon and Lipton, 1989).
654	Bell View mine (T10N, R27E, sec. 13) E. J. Wilson	Hematite/magnetite replacement bodies containing manganese occur in bedding plane and related shears in dolomite. The open pit exposes two main pods trending N35°-70°W and dipping 75°SW. One is 120 ft by 25 ft and the other is 45 ft by 15 ft. A smaller pod of iron and manganese oxides is in the trench southwest of the main pit. A magnetic survey by the BLM and surface examination do not show that these pods are continuous. The magnetic survey did indicate a maximum depth of 60 to 136 ft for the anomaly at the open pit.	One open pit and three trenches. About 7,000 tons of 60% iron and 400 tons of manganese were produced since 1963 (Wilson and others, 1974).	Twelve samples: whole-rock analysis showed seven samples contained 1.8% to 37% total iron, and 2.99% to 47.85% hematite. Two samples contained 40.3% and 47.4% manganese oxide. No anomalous precious metal values were found. About 6,000 tons of subeconomic resources are in place in the exposed iron replacement bodies, about 3,500 tons of iron ore are on the dump, and another several hundred tons are stockpiled at the millsite in sec. 14 (Kuizon and Lipton, 1989).
655	Iron Cap (T10N, R28E, sec. 18)	A hematite/magnetite replacement body is along a bedding plane shear in dolomite along a thrust fault. The iron nodule or lens is 3 ft by 6 ft and is in a shear which strikes due north and dips 30° east. Workings explore between the Jefferson and Saturday Mountain Formations and a sliver of Kinnikinic Quartzite. The limited size and lack extensions suggest the iron body is an isolated occurrence (Kuizon and Lipton, 1989).	Five trenches and two pits.	Three samples were collected. One chip sample of the iron nodule contained 62% iron, 0.006% chromium, and 0.006 oz/ton silver. Two grab samples of dolomite contained no anomalous metal values (Kuizon and Lipton, 1989).
656	Log Chain (T10N, R27E, sec. 23)	An erosional remnant of Saturday Mountain Formation dolomite overlies Kinnikinic Quartzite. The remnant extends for 2,000 ft along a N70°W trend and is 800 ft wide. A zone of brecciated dolomite whose matrix is replaced by earthy red hematite is exposed in a trench for about 100 ft along strike (Kuizon and Lipton, 1989).	Two trenches about 200 yd apart.	One grab sample contained 0.6 ppm silver and 52 ppm zinc, about twice expected background values for limestone (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
657	Williams Creek prospect (T10E, R28E, sec. 32)	Jefferson Dolomite is highly jointed and sheared in the limb of a syncline in the upper plate of a thrust fault. No main structures or extensive mineralized zones were found.	One shallow trench.	Two samples: a grab sample from the trench dump contained 30ppm zinc. An outcrop sample of sheared, brecciated quartzite just east of the thrust fault contained 310 ppm lead, 0.4 ppm silver, and 30 ppm zinc (Kuizon and Lipton, 1989).
658	Automatic mine (T9N, R28E, sec. 9)	A limonite vein in the sheared contact between quartzite and dolomite strikes N35°-50°E, and dips 54°-67°NW. It is exposed for about 240 ft along strike and ranges from 2 in. to 3 ft thick. Copper minerals include azurite, chrysocolla, and malachite; some lead and zinc minerals are disseminated throughout. The vein is likely faulted off at both northern and southern ends.	One 450-ft adit, one caved adit, one 20-ft shaft, and one caved shaft. In 1907, 1916, and 1917, about 150 tons of ore with an average grade of 12% copper were produced (Kuizon and Lipton, 1989).	Nine chip samples contained 0.27% to 6.89% copper, 0.027% to 1.0% lead, 0.12% to 0.18% zinc, and 0.05 to 0.34 oz/ton silver. One dump sample contained 1% copper, 0.067% lead, 0.036% zinc, and 0.12 oz/ton silver. About 2,400 tons of subeconomic vein material contains 3% copper, 0.24 oz/ton silver, 0.13% lead, and 0.19% zinc (Kuizon and Lipton, 1989).
659	Lucky Strike (T9N, R28E, sec. 17)	A nearly flat-lying vein of fine-grained, steely gray and earthy- red hematite, 2 to 3 ft thick is hosted by massive, gray dolomite. Exposures are too poor to determine the areal extent of the vein. The vein is in the lower plate, just east of the Horse Creek detachment fault.	Twelve pits, cuts, and trenches, one shallow shaft, and one 5-ft adit.	Six samples of hematite vein material contained 19.9% to 75.95% Fe_2O_3, averaging 54.0%. One sample of altered dolomite and two of quartzite contained anomalous lead, zinc, and copper (Kuizon and Lipton, 1989).
660	Jersey Belle (Merrill) (T7N, R29E, sec. 16)	Shear zones in dolomite of the Saturday Mountain Formation strike N37°E and dip 31°-82°SE. The shears consist of brecciated dolomite with limonite along fractures. A vuggy limonite replacement lens is also exposed underground for 40 ft; trend is N40°E and dip 38°SE. Stringers of calcite are common. The dolomite strikes N38°E and dips 37°SE.	One 132-ft adit, three caved adits, and three trenches.	Copper, lead and zinc were detected in each of nine samples at two to three times expected background levels; very small amounts of silver were also detected (Kuizon and Lipton, 1989).
661	Hope (T9N, R28E, sec. 18)	Iron-stained limestone west of the Horse Creek detachment fault contains veinlets of limonite	One caved adit.	One chip sample contained 0.11% lead and 0.03 oz/ton silver; two other samples contained anomalous amounts of lead and zinc (Kuizon and Lipton, 1989).
662	Westside (T9N, R28E, sec. 18)	A contact along the Horse Creek thrust fault between limestone and quartzite is mineralized. A 5-ft thick shear zone along the contact strikes N20E and consists of limonite and brecciated limestone and quartzite.	Two pits.	Of three samples, two contained 0.04% and 0.47% zinc, two contained 90 and 128 ppm lead, one contained 71 ppm copper, one contained 0.16 oz/ton silver, and two contained 20 and 30 ppb gold (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
663	Badger King mine (T9N, R28E, sec. 18)	Shear and fracture zones in quartzite contain limonite, disseminated lead and zinc minerals, and malachite staining. The mineralized zones are in an area about 1,000 ft by 2,600 long along the Horse Creek detachment fault that separates quartzite from limestone. The quartzite is heavily limonite stained; carbonate rocks are brecciated and recrystallized. A 1.3-to 5-ft-thick andesite dike follows the fault contact, striking N85°E and dipping 73°SE to 70NW.	Two adits 115 and 90 ft, one 110-ft trench, 4 caved adits, and 12 pits. In 1947 and 1951 a small amount of ore containing lead and silver was produced (Kuizon and Lipton, 1989)	Of 22 samples, one select sample contained 2.16% copper; all others contained less than 0.84%. One select sample contained 1.52% lead; all others were less than 0.38%. A random chip sample contained 1.18% zinc; all others were less than 0.46%. One select sample contained 3.5 oz/ton silver; all others were less than 0.96 oz/ton. Two samples contained 45 and 15 ppb gold. (Kuizon and Lipton, 1989).
664	Cleopatra (T9N, R28E, sec. 17)	Limonite-stained quartzite.	Two caved adits and one partially caved adit.	Two grab samples of quartzite contained anomalous lead and zinc (Kuizon and Lipton, 1989).
665	Triumph (T9N, R28E, sec. 16)	Fractures in Kinnikinic Quartzite are filled with secondary copper, lead, and zinc minerals and minor amounts of iron and manganese oxides (Kuizon and Lipton, 1989).	One caved adit, one caved shaft, one trench, and two pits.	One chip sample of fractured quartzite contained 860 ppm lead, 670 ppm copper, 30 ppm zinc, and 3.9 ppm silver. Select samples of stockpile material contained 1.23% and 1.95% lead, 0.25% and 1.95% copper, 40 ppm and 0.13% zinc, and 1.28 and 2.63 oz/ton silver (Kuizon and Lipton, 1989).
666	Badger mine (T9N, R28E, sec. 16) Wilma Davis	Oxidized veins, pods, and lenses in dolomite contain secondary lead, zinc, and iron minerals with small amounts of galena and sphalerite. The mineralized zones and veinlets of siliceous limonite and jasperoid are along shears in the lower plate of the Badger Creek thrust fault. Three stopes in the main adit cover a mineralized area of about 240 ft by 100 ft; the main ore body strikes N45°W and dips 35° to 50°NE.	Four adits are 10, 42, 136, and 1,000 ft long; five adits are caved. Other workings include two shafts 12 and 100 ft deep, one glory hole, and nine trenches and open cuts. The mine produced about 2,000 tons of ore containing 60% lead prior to 1911 (Bell, 1911, p. 30). About 600 tons produced between 1910 and 1948 contained as much as 37% lead and 29 oz/ton silver with smaller amounts of copper and gold (Kuizon and Lipton, 1989).	Of 51 1986-87 USBM samples, fifteen samples of the remaining ore zone in the main stope averaged 0.6% lead, 1.4% zinc, 0.09% copper, and 1.86 ppm silver. A high-grade sulfide sample contained 35.2% lead, 5.03% zinc, 3.20 oz/ton silver, and 0.09% copper. A random chip sample of mineralized dolomite contained 0.03% lead, 0.48% zinc, 0.05% copper, and 1.2 ppm silver (Kuizon and Lipton, 1989). Known ore bodies have been essentially mined out.
667	Rainbow (T9N, R28E, sec. 19)	A vertical shear zone strikes N29°W in quartzite and dolomite. The zone is exposed underground for 75 ft where it consists of hematite and limonite along with brecciated country rock. In a lower zone, a 7-ft-thick mafic dike trends N12°E in quartzite.	One adit caved at 65 ft and one 22- by 10-ft cut.	Nine samples contained 17 ppm to 0.22% lead, 11 ppm to 0.32% zinc, and 14 to 112 ppm copper (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
668	Bar 2 (T9N, R28E, sec. 19)	Shear zones in quartzite and carbonate rocks contains malachite, azurite, and chalcocite. The zones trend mainly toward the east for a distance of 1,100 ft and consist primarily of limonite and pulverized quartzite, limestone, and dolomite. Host rocks are in an erosional remnant of the Horse Creek glide block. Bands of black shale are interlayered in the quartzite and carbonate rocks.	One 10-ft-deep shaft with about 45 ft of drifting; one 43-ft-long adit, one 50-ft-long trench, and two pits.	Of ten samples, one contained 0.35% copper, 1.64% lead, 3.56 oz/ton silver, 0.02% zinc, and 5 ppb gold. Remaining samples contained less than 0.06% copper and zinc, less than 0.5% lead, and less than 24 ppm silver (Kuizon and Lipton, 1989).
669	Nipper (T9N, R28E, sec. 19)	Highly fractured quartzite, limestone, dolomite, black shale, and sandstone are in places heavily stained with limonite. The quartzite-dolomite contact underground strikes N78°E and dips 20°NW.	Three adits 75, 40, and 8 ft long; two caved adits; and one 50-ft-long trench.	Anomalous levels (less than 0.19%) of copper, lead, and zinc were detected in each of eight samples collected; silver ranged from 0.5 to 5.2 ppm. One sample contained 5 ppb and two contained 10 ppb gold (Kuizon and Lipton, 1989).
670	Bar No. 7 (T9N, R28E, sec. 20) Wilma Davis	Iron-oxide stained shears and fractures are in Kinnikinic Quartzite. A 0.75-ft shear strikes N85°W and dips 44°NE. Copper and manganese staining are along fractures.	One 4-ft adit; two pits.	Three samples contained anomalous amounts of lead and two contained anomalous amounts of copper. One sample contained 10 ppb gold (Kuizon and Lipton, 1989).
671	Badger Creek borrow site (T9N, R28E, sec. 20)	Precambrian quartzite of the Wilbert Formation (Kuizon and Lipton, 1989).	No data.	Approved as a rip rap site (USFS, 1988).
672	Cedar Post (T9N, R28E, sec. 20)	Fractured and brecciated Kinnikinic Quartzite is heavily iron and manganese stained at a contact with Precambrian quartzite. The fractured rocks are in the lower plate of the Badger Creek thrust fault.	One 50-ft adit, one caved adit, and four small pits.	Two grab samples of dump material: one contained 0.022% lead, and 0.0008% zinc; the other contained no anomalous metals (Kuizon and Lipton, 1989).
673	Last Chance (T9N, R28E, sec. 20) Wilma Davis	Mineralized shear zones are in brown quartzite along a contact with quartzite. The shear zones contain blebs and veinlets of galena, plattnerite, and sphalerite. The zones strike N80°W and dip 80°NE. The quartzite is fractured and contains stringers of calcite and bands of iron-staining. Dump material includes basalt but none was found in outcrop.	Upper workings include three adits 160, 70, and 6 ft long, one inclined shaft, three caved adits, and five trenches and pits. Lower workings are 2,000-3,000 ft southwest and include three pits and one caved adit.	Nine chip samples from the upper workings contained 0.01% to 15.6% lead, 80 ppm to 7.63% zinc, and 0.1 ppm to 2.62 oz/ton silver. Three select samples contained 14.3% to 57.2% lead, 1.44% to 7.93% zinc, 1.11 to 8.44 oz/ton silver, and 56 to 205 ppm copper. One chip sample contained 5 ppb gold. Samples from the lower workings contained anomalous amounts of lead and zinc (Kuizon and Lipton, 1989).
674	Red Bird (T9N, R28E, sec. 21)	Limestone with pods of quartz just west of the Badger Creek thrust fault is heavily stained and encrusted with limonite.	One shallow pit.	One sample of limonitic quartz and limestone contained 215 ppm copper, 215 ppm lead, and 20 ppm zinc (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
675	Valley View mine (T9N, R28E, sec. 29) Wilma Davis	Quartzite and dolomite near their contact contain plattnerite and galena in fracture fillings and thin veins (about 0.5 in thick). An upper set of workings develops weakly mineralized faults and shears as much as 4 ft thick in quartzite and dolomite. Fine-grained galena in brecciated quartzite occurs in pockets and stringers in these workings. The shears strike northeasterly and dip steeply to moderately to the northwest or southeast.	There are 18 adits (4 caved), 18 trenches, and 15 pits, in an area about 2,200 ft by 2,000 ft. More than 2,020 ft of underground workings were developed. Production is unrecorded, but is likely small.	Thirty-four chip and seven select or grab samples: eighteen chip samples from the lower workings contained 0.01 to 1.37 oz/ton silver, 80 ppm to 4.9% lead, averaging 1.01%; and 26 ppm to 0.12% zinc. Sixteen chip samples from the upper workings contained 0.003 to 1.31 oz/ton silver, 0.07% to 4.48% lead, and 0.007% to 0.15% zinc. Select samples contained 0.5 to 1.99 oz/ton silver, 4.08% to 7.37% lead, and 0.03% to 0.57% zinc. Grab samples contained 0.09 to 21.04 oz/ton silver, 0.09% to 23.1% lead, 0.05% to 0.67% zinc, and 0.02% to 0.15% copper (Kuizon and Lipton, 1989).
676	Uncle Ike Creek prospect (T8N, R28E, sec. 12)	A lens of limonitic, jasperoidal boxwork at the contact of dolomite and quartzite contains oxidized lead and zinc minerals. Dimensions are undetermined because of poor exposure. The contact trends north-northwesterly and dips steeply to the east.	One caved adit about 20 ft long, and two small pits.	One select grab sample contained 0.027% lead, 0.11% zinc, 0.003% copper and 0.3 ppm silver (Kuizon and Lipton, 1989).
677	Copper Mountain mine (T8N, R29E, sec. 8) Gold, Inc.	A mineralized fault zone in dolomite strikes N40°-50°W and dips 10°-20°SW over a 500 ft length. The zone is oxidized and contains malachite, azurite, chrysocolla, chalcocite, galena, cerussite, and silver in a matrix of limonite and fault gouge. Discontinuous veins within the zone range from fractions of an inch to 6 ft in thickness (Nickelson, 1955).	Underground workings are now caved. Old workings included five adits, one 120 ft long, and a shaft that are now obscured by a 500-ft bulldozer cut; eight trenches and one pit are south of the cut. A total of 62 tons of ore were mined that contained 15% to 20% copper (Nickelson, 1955). The ore also contained 0.3 to 2 oz/ton silver; an 18-ton stockpile averaged 14% copper (Kuizon and Lipton, 1989).	Two samples of mineralized dolomite from the bulldozer trench contained 5.18% and 12.6% copper, 750 and 90 ppm lead, and 600 ppm and 0.3% zinc. Two samples of oxidized vein material contained 0.26% and 0.31% zinc, 400 ppm and 0.19% lead, and 28 and 134 ppm copper. Small amounts of silver, 0.1 ppm to 0.29 oz/ton, were detected in all samples (Kuizon and Lipton, 1989).
678	Copper Mountain No. 8 (T8N, R29E, sec. 17) Levi Thomason, Universal Exploration Co.	Hematite and limonite fill leached fractures in shear zones along the contact of the Jefferson and Middle Canyon Formations just west of the Black Canyon Fault.	Four shallow trenches and one pit.	One sample across a dolomite-quartzite contact contained 59 ppm copper, 25 ppm lead, 355 ppm zinc, and 0.1 oz/ton silver. Two samples of hematite and quartz in breccia contained 50 and 96 ppm copper, 0.26% and 0.27% lead, 0.48% and 1.00% zinc, and 0.18 and 0.31 oz/ton silver (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
679	Whitebird (Mormon Gulch) mine (T8N, R29E, sec. 17) Bill Yearsley	A brecciated, partially leached, limonitic fault zone containing galena, and lead and zinc oxides is in limestone. The zone also contains calcite and barite. The fault zone strikes N75°-80°W and dips 65°-80°NE. It was exposed for 120 ft downdip and 50 ft along strike in the now inaccessible main shaft (Taber, 1949). The fault zone in 5-8 ft wide, and the ore zones are as much as 2 ft wide.	One 120-ft shaft with five levels that total 170 ft, and one 100-ft adit are caved; two open adits are each 35 ft long. In 1948 a small amount of ore was produced that averaged 15% lead and 3.5 oz/ton silver (Kuizon and Lipton, 1989). Taber (1949) reported that 75 tons of ore were produced that averaged 17% lead.	Three samples contained 1.6% to 19.3% lead and 0.01 to 5.0 oz/ton silver (Taber, 1949). Three 1986-87 samples of vein material contained 0.13% to 0.15% zinc, and 180 to 475 ppm lead; five select samples contained 0.2% to 17.9% lead, 0.03% to 7.16% zinc, and 0.03 to 2.07 oz/ton silver (Kuizon and Lipton, 1989). Taber (1949) estimated that as much as 500 tons of indicated and 1,000 tons of inferred resources remain that contain 10% to 15% lead and 3 to 4 oz/ton silver.
680	Bighorn (Mormon Gulch 1-3) mine (T8N, R29E, sec. 17) Bill Yearsley	Argentiferous galena, and lead, iron, and manganese oxides are in lenses and veins in generally west-trending shears in dolomite and limestone and shale of the Middle Canyon Formation. Two shear zones exposed underground strike N85°E and dip about 60°SE; veins are 0.5 to 2 ft thick in shear zones as much as 7.0 ft thick. One shear in a now-caved shaft strikes N85°E, dips 70°NW, and is 4 ft thick (Kiilsgaard and others, 1951).	Underground workings were caved in 1986; they consist of one 162 ft adit, one 85-ft inclined shaft, and two stopes caved to the surface. In the years 1911-1913, 1917, and 1948; 156 tons were produced that yielded 88,178 lb lead, 1,341 oz silver, and trace gold (Kuizon and Lipton, 1989).	Six chip samples of vein and shear material contained 0.04% to 2.37% lead, 0.003 to 0.88 oz/ton silver, and 0.06% to 0.17% zinc; one contained 10 ppb gold. One chip from a stope contained 2.33% lead, 3.02% zinc, and 0.55 oz/ton silver. One grab sample contained 3.80% lead, 0.58% zinc, 0.90 oz/ton silver, and 0.013% copper (Kuizon and Lipton, 1989). As much as 2,000 tons of inferred resources averaging 8% lead and 3 oz/ton silver were estimated by Shaffer (1943).
681	Fallert Springs prospect (T8N, R28E, sec. 24)	Contact between white and iron-stained purple quartzite of the Precambrian Wilbert Formation.	None.	One sample from the contact contained 0.4 ppm silver, 230 ppm copper, 1 ppm lead, and 70 ppm zinc (Kuizon and Lipton, 1989).
682	UI No. 6 and 7 (T8N, R28E, sec. 24) Don Owen	East-trending shear zones in argillite or phyllitic quartzite contain quartz veinlets with minor amounts of copper and silver, and trace amounts of gold. Two generally east-west bedding plane shears, 14 ft and 37 ft long, range from 0.8 to 2.0 ft thick. A NE-trending shear exposed for about 10 ft is 1.7 ft thick.	Two adits are 6 ft and 46 ft long; two trenches are 17 ft and 25 ft long.	Six samples were collected. One stockpile sample contained 105 ppb gold and 0.051% copper. Two chip samples contained 25 to 65 ppb gold, and two contained 0.1 and 0.4 oz/ton silver. Five chip samples contained 0.05% to 1.18% copper (Kuizon and Lipton, 1989).
683	Windfall (AU No. 27) (T8N, R29E, sec. 20) Gold Inc.	Leached and oxidized veins fill fractures in dolomite. The area is in the lower plate, west of the Black Canyon thrust fault. A north-striking, 75°E-dipping fault transects the area.	Three prospect pits, two trenches.	Four samples contained anomalous amounts of lead and zinc (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
684	Sparrow (T8N, R29E, sec. 21) Gold Inc.	Leached and limonite-stained replacement vein material is in dolomite east of the Black Canyon thrust fault.	One trench	One grab sample contained 276 ppm lead and 148 ppm zinc (Kuizon and Lipton, 1989).
685	Johnson prospect (B & N group) (T8N, R29E, sec. 29)	Northeast-trending shear and fault zones in dolomite are locally mineralized. In the upper part of the prospect, a 10- to 40-ft-thick band of white quartzite is intercalated with the dolomite. The dolomite is intensely fractured and stained with iron oxides; the prospect is one-half mile west of the Black Canyon thrust fault. The shears dip to the northwest. Mineralized zones consist of blebs and disseminations of galena and sphalerite in a limonitic dolomite matrix (Kuizon and Lipton, 1989).	Upper workings include a 60-ft-deep inclined shaft, a 350-ft adit, a 35-ft adit, four adits 5 to 10 ft long, four pits and one trench. A lower working consists of one 135-ft adit.	Each of 34 samples contained small amounts of silver, as much as 1.52 oz/ton. Seven chip samples contained 1.49% to 17.7% zinc; four select samples contained 1.38% to 14.3% zinc. Six chip samples contained 1.29% to 35.5% lead; four select samples contained 1.55% to 39.0% and one contained 60.3% lead (Kuizon and Lipton, 1989).
686	Sentinel (North Creek No.1) mine (T8N, R29E, sec. 32) Richard Nichols and F. Byrd	Diversely oriented shears and faults are in gray dolomite. The dolomite is in a 35° SE. plunging anticline in the lower plate, one-half mile west of the Black Canyon thrust fault. The gouge-filled, limonite-stained shear zones contain replacement bodies of galena, cerussite, sphalerite, and smithsonite.	One 190-ft adit and one 70-ft adit are connected by an ore chute; one pit. Between 1947-1949, 330 tons were produced that yielded 58,045 lb lead, 61,827 lb zinc, 88 oz silver, and 184 lb copper (USBM files by permission of owner).	Of 56 samples, most contained amounts of silver near the detection limits, the highest at 1.7 ppm. Twenty-four chip samples contained 1.34% to 22.90% zinc, and 16 chip samples contained 1.0% to 19.4% lead. Two select samples contained 14.1% and 17.4% zinc and two contained 16.0% and 35.5% lead. Wallrock samples also contained anomalous amounts of lead and zinc. An estimated 8,000 tons of indicated and 29,500 tons of inferred subeconomic resources are at the larger adit; average grade is 8.5% zinc and 2.7% zinc (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
687	Wilbert mine (T8N, R29E, sec. 32) Gary Baker	Mineralized zones are just west of the Black Canyon thrust fault in Ordovician quartzitic dolomite near a contact with overlying quartzite. The zones follow northwest trending faults that have been traced for 2,000 ft laterally and to a depth of about 750 ft (Kuizon and Lipton, 1989). Most prominent are irregular replacements of fine-grained argentiferous galena, oxidized in places to anglesite and cerussite. Galena also occurs as fracture fillings along shear zones, in veins, and disseminated in wallrock. Altered silicic and mafic dikes suggest remote magmatic control of the mineralization (Anderson, 1947, p. 368-371). The mineralized zone is cut off at the north end by the North Creek fault.	More than 18,000 ft of drifts, crosscuts, and shafts are in three main underground levels. The portal of the Daylight Tunnel was flooded in 1986-87. From 1906-1982, the mine produced more than 140,000 tons of ore with grades ranging from 4% to 47% lead and 0.5 to 6 oz/ton silver in addition to smaller amounts of zinc, copper, and gold. Production after 1941 came mainly from reworking of old dumps. Small amounts of ore were produced in 1965 and 1982 (Kuizon and Lipton, 1989).	Of 107 samples, five from the main adit contained 2.79% to 51% lead, 0.28 to 18.22 oz/ton silver, 0.04% to 1.53% zinc, and 22 ppm to 0.28% copper; two contained 5 ppb gold and one 15 ppb gold. Remaining samples contained 1 ppm to 49.9% lead, 0.1 ppm to 23.3 oz/ton silver, 11 ppm to 1.11% zinc, and 2 ppm to 3.59% copper; two contained 5 ppb gold and one 15 ppb gold. Shaffer (1945, p. 6-7) estimated 1,000 tons of ore remaining in pillars and old stope faces; another 3,000 to 7,000 tons of inferred resources averaging 13% lead and 2.1 oz/ton silver extend north from the main ore body (Kuizon and Lipton, 1989).
688	Ore House No. 7-8 (T8N, R29E, sec. 32) Don Owen	Shear zones and fractures in Precambrian white and brown quartzite contain disseminated galena. The area is west of the Black Canyon thrust fault and is complexly folded and faulted.	Five adits 5 to 30 ft long, one caved adit, and five pits. A small amount of ore was likely produced and included with Wilbert mine production (Kuizon and Lipton, 1989).	Five chip samples contained 0.16% to 2.01% lead and 0.01% to 0.16% zinc; two contained 5 ppb and 15 ppb gold. Three select samples contained 18.8% to 44.8% lead, 0.41 to 1.11% zinc, 0.7 to 3.85 oz/ton silver, and 0.04% to 0.24% copper (Kuizon and Lipton, 1989).
689	Nellie Boyd (T8N, R29E, sec. 33)	Quartzite breccia with a matrix of quartz and limonite is at the thrust fault contact of brown shale and quartzite.	One 30- by 15-ft trench.	One sample contained anomalous amounts of copper, lead, zinc, and silver (Kuizon and Lipton, 1989).
690	Waymire (T8N, R29E, sec. 4)	Shear zones in gray to brown dolomite are just west of the Black Canyon thrust fault. The shears are deeply oxidized and contain boxworks of limonite. One shear is as much as 9 ft thick strikes N10°W and dips from vertical to 54°NE; a second shear strikes N6°E and dips 36° to 42°NW.	One caved 15-ft shaft, one 34-ft adit, and one pit.	Six samples contained 35 to 347 ppm lead, 76 to 0.16% ppm zinc, and 0.1 to 0.3 ppm silver (Kuizon and Lipton, 1989).
691	Camp Creek No. 4 (T7N, R29E, sec. 4)	An 8-ft-thick shear zone is at the thrust fault contact of dark brown to black dolomite with white to brown quartzite. The highly fractured host rocks are decomposed, altered and stained with iron and manganese oxides along the shear zone. The shear zone strikes northwest and dips 59° to 70°NE.	One 25-ft adit and one caved adit.	Anomalous amounts of lead and zinc were detected in three samples (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
692	Camp Creek No. 1 (T7N, R29E, sec. 4)	The workings explore iron-stained shear zones in dolomite just west of the Black Canyon thrust fault. The shears consist of altered, brecciated dolomite. The northwesterly trending shears exposed in the main adit range from 0.4 to 6.8 ft thick over a 5-ft length.	Two adits, 30 and 130 ft long.	Five chip samples were analyzed only for gold and silver; one contained 5 ppb gold and two contained 0.4 ppm silver. One sample contained 48 ppm lead and 23 ppm zinc (Kuizon and Lipton, 1989).
693	Camp Creek No. 3 (T7N, R29E, sec. 5)	Brown and white quartzite is fractured and stained with iron oxides. The area is intensely faulted; beds are overturned. Calcite stringers are common. Outcrop exposure is poor.	Two pits and one adit that is caved 100 ft from the portal.	Anomalous amounts of copper, lead, zinc, and silver were detected in three samples (Kuizon and Lipton, 1989).
694	Red Ledge No. 3 (T7N, R29E, sec. 5) Bill Yearsley	Quartzite is brecciated, altered, and heavily stained with iron oxides along a phyllite interbed contact.	One caved adit.	One select sample contained 110 ppm copper (Kuizon and Lipton, 1989).
695	Lookout mine (T7N, R29E, sec. 5) Gary Baker	Mineralized fracture and shear zones are along a thrust fault contact between Kinnikinic Quartzite and dolomite and quartzite of the Summerhouse Formation. The zones contain secondary lead, zinc, and copper minerals. The main zone exposed underground extends for 60 ft and is about 35 ft wide; it trends N55°E to N5°W and is stoped to the surface.	One 75-ft adit with a total of 180 ft of workings, one shaft, two inclined shafts, eight trenches, and nine pits. Production has been reported with that of the Wilbert mine (Kuizon and Lipton, 1989).	Eight chip samples from the main adit contained 7.48% to 27.3% lead, 49 to 242 ppm zinc, 0.15 to 2.37 oz/ton silver, and 17 to 900 ppm copper. High grade select samples contained as much as 40.2% lead and 14.96 oz/ton silver (Kuizon and Lipton, 1989).
696	La Riviere Perdu No. 6 & 7 (T7N, R29E, sec. 5) Bill Yearsley	Argentiferous galena, cerussite, and secondary zinc minerals fill sheared and brecciated zones in quartzite and dolomite. One gouge-filled zone is exposed for 70 ft along a N10°W trend; dip is 35°NE and thickness ranges from 1.7 to 2.0 ft. A bedding plane shear between quartzite and siltstone contains secondary copper minerals and limonite. This shear is exposed for 135 ft along a northwest trend; dip is to the northeast and thickness ranges from 0.5 to 2.0 ft. Secondary lead and zinc minerals are in a 10-ft lens of cellular limonite and jasperiod.	One 135-ft inclined shaft with a 30-ft slope, three adits 70, 18, and 9 ft long, one caved adit, eight trenches.	Nine of 27 samples contained 0.03 to 0.96 oz/ton silver, seven contained 0.26% to 4.86% lead, and seven contained 0.01% to 1.91% zinc. One sample contained 15 ppb gold. The remaining samples contained lesser amounts of copper, lead, zinc, and silver (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
697	Great Western mine (T7N, R29E, sec. 8) Bill Yearsley	Shear zones in dolomite and dolomitic quartzite contain veins, lenses, and pods of argentiferous galena, cerussite, hemimorphite, and copper minerals. Ore minerals are also disseminated in the wallrock. The main mineralized zone can be traced for 2,300 ft and is as much as 60 ft thick at the surface. It strikes N.10-20W. and dips 70-80 SW. The largest zone exposed underground is 95 ft by 50 ft and 7.5 ft thick.	Nineteen open adits contain more than 4,000 ft of drifting; one of three caved adits had about 700 ft of workings. Other workings include six shafts and more than 40 pits, trenches, and open cuts. Between 1907 and 1960, more than 700 tons containing 6% to 58% lead, 1 to 131 oz/ton silver, and 0.06% to 3% copper produced. Bill Yearsley (personal commun., 1986), reported that about 60 tons of silver ore were produced in 1985-1986.	Of 264 samples, 73 chip samples contained 0.10% to 15.8% lead, 54 contained 0.20 to 44.9 oz/ton silver, 42 contained 0.11% to 3.15% zinc, and 8 contained 0.11% to 0.84% copper. Select samples contained 6.04% to 35.5% lead, 0.43 to 122.8 oz/ton silver, 0.11% to 0.2% zinc, and 0.17% to 3.6% copper. About 4,900 tons of subeconomic resources remain in pockets that average 1.7 oz/ton silver, 3.6% lead, and 0.5% copper (Kuizon and Lipton, 1989).
698	May Queen (T7N, R29E, sec. 9) Don Owen	Three northwest-trending, iron-oxide stained shears in quartzite are 28 to 48 ft long and 0.7 to 4.5 ft thick. One 30-ft long, 3-ft thick fracture zone contains limonite and disseminated galena.	Three adits 6, 14, 15, and 90 ft long and one inclined shaft 15 ft long.	Two of nine chip samples contained 0.91% and 2.53% lead; two other samples contained anomalous zinc values. One sample contained 10 ppb gold; six samples collected by the mining claim owner contained 70 to 500 ppb gold (Kuizon and Lipton, 1989).
699	Camp Creek No. 2 (T7N, R29E, sec. 4)	A heavily iron-stained zone is in sandstone in the upper plate of the Black Canyon thrust fault. No ore minerals were observed.	One small pit	One sample from the iron-stained zone contained anomalous lead content for arenaceous rocks; no other metals were anomalous (Kuizon and Lipton, 1989).
700	Ore House No. 32b (TO7N, R29E, sec. 9) Don Owen	Sheared and iron-stained dolomite contains quartz veinlets and vugs filled with limonite. The limonitic zones are just west of the Black Canyon thrust fault.	Two pits.	One select sample contained 85 ppm copper, 25 ppm lead, and 0.42% zinc. One grab sample contained 86 ppm copper, 22 ppm lead, and 0.27% zinc (Kuizon and Lipton, 1989).
701	Rubie (T7N, R29E, sec. 9)	Altered, brecciated dolomite with abundant hematite along fractures and brecciated white quartzite with limonite, secondary copper minerals, and sparse galena are in the lower plate of the Black Mountain thrust fault.	Two caved adits and one 20- by 6-ft trench.	Two select samples of dolomite and quartzite contained anomalous levels of copper, lead, zinc, and silver (Kuizon and Lipton, 1989).
702	Pearl (T7N, R29E, sec. 16)	Gray dolomite and white quartzite are brecciated. The dolomite contains numerous calcite stringers and minor malachite staining, and the quartzite contains disseminated galena, malachite, and limonite.	Two caved adits.	Three samples detected no significant levels of lead or copper (Kuizon and Lipton, 1989).

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
703	La Riviere Perdu No. 28 (T7N, R29E, sec. 17) Bill Yearsley	Heavily iron-stained quartzite contains stringers of limonite. Brecciated zones within the quartzite are cemented by limonite.	Two trenches, 20 and 30 ft long.	Two select samples contained 0.3 and 3.0 ppm silver (Kuizon and Lipton, 1989).
704	South Creek No. 4 (T7N, R29E, sec. 17) Bill Yearsley	White quartzite and grey to brown dolomite are brecciated and sheared in zones that trend both northwest and northeast. The zones are heavily stained with iron oxides; secondary lead minerals occur as streaks and blebs, and malachite stains fractures. Intense faulting obscures mineralized structures.	Two adits with 70 and 75 ft of drifting, one caved adit.	Five of seven samples contained 200 to 650 ppm lead, 28 to 415 ppm copper, and 50 to 280 ppm zinc. Six contained 0.6 ppm to 1.75 oz/ton silver (Kuizon and Lipton, 1989).
705	South Creek No. 10 (T7N, R29E, sec. 17) Bill Yearsley	Two parallel shear zones 4 ft apart strike N16°W and dip 60° to 74°NE in iron-stained white quartzite.	One 87-ft adit.	Eight chip samples contained anomalous amounts of copper, lead, zinc, and silver (Kuizon and Lipton, 1989).
706	Ajax mine (Pickup, South Creek 20) (T7N, R29E, sec. 16) Bill Yearsley	A series of parallel, northeast- trending, northwest-dipping shears and faults are in quartzite. In the main adit, silver-bearing galena and plattnerite are localized along fractures and disseminated in massive white quartzite adjacent to two shear zones trending N10°-50°E and dipping 40°NW to vertical. The shear zones are less than 0.5 ft thick; the brecciated and fractured area between the two ranged from 2 to 5.5 ft thick along 500 ft of exposure.	Three adits 42, 55, and 500 ft long; two caved adits, two open cuts, and three pits. More than 150 tons of ore were produced in 1947 that contained 28% lead, 4 oz/ton silver, and 0.07% copper (Kuizon and Lipton, 1989).	Twenty-eight samples were collected. Eighteen chip samples of sheared quartzite from the main adit contained 0.01% to 3.14% lead, 0.006 to 0.93 oz/ton silver, and 8 to 940 ppm zinc. One select sample contained 16.1% lead, 1.66 oz/ton silver, 440 ppm zinc, and 151 ppm copper. Remaining samples contained 0.007% to 0.17% lead, 0.003 to 0.1 oz/ton silver, and 13 to 860 ppm zinc (Kuizon and Lipton, 1989).
707	South Creek No. 16 (T7N, R29E, sec. 17) Bill Yearsley	A shear zone strikes N28°E and dips 72°NW in brown dolomite of the Summerhouse Formation. The shear contains malachite and azurite fracture fillings.	One 18- by 10-ft pit.	One chip sample contained 338 ppm copper and 0.4 ppm silver. One select sample contained 1.71% copper and 0.49 oz/ton silver (Kuizon and Lipton, 1989).
708	South Creek No. 24 (T7N, R29E, sec. 20) Bill Yearsley	A shear zone strikes N52°W and dips 15°SW in quartzite of the Wilbert Formation. The zone is heavily stained with iron oxides.	One 15- by 5-ft pit.	One chip sample contained three times background levels of copper (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
709	San Francisco prospect (T7N, R29E, sec. 22)	A shear zone as much as 7 ft thick in dolomite and quartzite contains a siliceous limonitic vein that strikes N 15°-20°W, dips 70°-90°NE, and extends for about 100 ft along the surface. About 70 ft is explored by workings. The shear contains chrysocolla, malachite, possibly chalcocite, and minor amounts of silver, lead, and zinc minerals. Copper minerals also occur in fractures in dolomite and quartzite west of the shear zone.	One 12-ft adit with an 11-ft winze, four caved adits, three pits.	Eight samples: four chip samples contained 0.008 to 0.61% copper, 0.025% to 0.28% lead, and 0.02 to 0.292 oz/ton silver. A stockpile sample contained 2.6% copper, 0.22% lead, and 0.134 oz/ton silver. One select sample of siliceous limonite contained 0.051% lead, 0.01% zinc, and 0.061 oz/ton silver (Kuizon and Lipton, 1989).
710	South Creek No. 36 (T7N, R29E, sec. 20) Bill Yearsley	An iron-stained shear zone between slate and quartzite of the Wilbert Formation is 4.5 ft thick, strikes N10°E, and dips 50°SE.	One 18- by 8-ft pit.	One chip sample of shear zone material contained 0.4 ppm silver (Kuizon and Lipton, 1989).
711	South Creek No. 61 (T7N, R29E, sec. 29) Bill Yearsley	Two shears strike N11°W and N18°E and dip vertically and 65°NW, respectively, in altered shale. The shears consist of veinlets and lenses of quartz with heavy iron staining.	One shallow shaft.	One chip sample contained 52 ppm lead, 110 ppm zinc, and 0.4 ppm silver (Kuizon and Lipton, 1989).
712	South Creek No. 78 (T7N, R29E, sec. 29) Bill Yearsley	Numerous northeast trending faults displace a contact between dolomite quartzite. The zones are limonite stained and contain malachite, azurite, and chrysocolla along fractures.	Two pits.	Two select samples contained 5.03% and 10.8% copper and 0.19% and 0.69% zinc (Kuizon and Lipton, 1989).
713	North Star (South Creek No. 107) (T7N, R29E, sec. 28) Bill Yearsley	Pods and lenses of hematite and limonite are in brecciated zones, mostly in quartzite along its contact with quartzite and dolomite of the Summerhouse Formation. Clayey gouge and malachite stains are common on working dumps.	One 4-ft adit, two caved adits, one caved shaft, and five trenches 40 to 55 ft long.	Four select stockpile samples contained 0.17%, 1.87%, 2.83%, and 11.5% copper. No samples contained more than 0.02% lead, 0.4% zinc, or 1.7 ppm silver (Kuizon and Lipton, 1989).
714	South Creek No. 121 (T7N, R29E, sec. 33) Bill Yearsley	Quartzite is cut by a fault zone striking N35°W and dipping 67°NE. The zone consists of altered quartzite with malachite and heavy iron stains.	One 50-ft adit.	In three samples copper ranged from 160 ppm to 0.7%, lead and zinc were less than 0.1%, and silver ranged from 0.21 to 0.40 oz/ton. Gold was 10 and 15 ppb in two samples (Kuizon and Lipton, 1989).
715	South Creek No. 119 (T7N, R29E, sec. 33) Bill Yearsley	Purple quartzite of the Wilbert Formation is intensely sheared and heavily limonite stained. Shear zones strike N10°E and have a vertical dip.	One caved adit.	One chip and one grab sample contained 82 and 182 ppm copper, 135 and 84 ppm lead, 0.6 ppm silver, and 0.5 ppb gold (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
716	South Creek No. 147 (T7N, R29E, sec. 33) Bill Yearsley	A shear zone strikes N5°E and dips 25°SE in phyllite near a fault contact with quartzite. The shear contains leached quartz breccia, limonite, and gouge. The fault zone contains heavily iron-stained quartzite and limonite pseudomorphs after pyrite; it trends N10°-20°W and dips 85°SW.	One 20-ft adit and one caved adit.	Two to six times expected background levels of copper, lead, and zinc were detected in two samples (Kuizon and Lipton, 1989).
717	Black Back (T7N, R29E, sec. 33) Bill Yearsley	A shear zone in quartzite strikes N50°W and dips 36°SW and is exposed for 300 ft at the surface. The shear is as much as 2.5 ft thick underground and contains a 0.5 ft stringer of galena. Galena is also disseminated in the brown quartzite wallrock. Copper and iron staining is common along fissures.	One 10-ft adit.	A chip sample contained 1.37% lead, 0.18 oz/ton silver, and 80 ppm zinc. A stockpile sample contained 4.39% lead, 1.08 oz/ton silver, 73 ppm zinc, and 5 ppb gold. An outcrop sample of the shear contained 0.22% lead (Kuizon and Lipton, 1989).
718	White Rock (T7N, R29E, sec. 34)	Galena is in fractured white Ordovician quartzite along east trending shear zones (Anderson, 1948, p. 14).	No data.	No data, no workings were found during field investigations (Kuizon and Lipton, 1989).
719	Protection (BC No. 23-24) (T7N, R29E, sec. 27) Bill Yearsley	Workings explore the Black Canyon thrust fault which transects (N20°-30°W) dolomite and quartzite. The fault zone is composed of siliceous limonite and altered dolomite and quartzite. Two main shears that trend N10°-40°W are explored. One shear zone is 85 ft long and 0.5 to 2.3 ft thick. The other shear is exposed for 275 ft and is 1 to 5 ft thick.	Five adits are 10, 30, 80, 100, and 300 ft long. One other adit is caved.	Forty-two samples were collected. Eight contained 0.02 to 0.27 oz/ton silver; ten contained 0.11% to 0.59% lead, and 12 contained 0.10% to 0.429% zinc (Kuizon and Lipton, 1989).
720	BC No. 51 (T7N, R29E, sec. 34) Bill Yearsley	Fractured and silicified dolomite contains quartz lenses and veinlets as much as 0.8 ft thick.	None.	Two chip samples of quartz contained no anomalous concentrations of gold or silver (Kuizon and Lipton, 1989).
721	BC No. 53 Extension (T7N, R29E, sec. 35)	Small northwest-trending shear zones are in interbedded limestone, shale, and argillite. The zones contain limonitic and siliceous fracture fillings with trace amounts of secondary lead and zinc minerals.	Two trenches and one pit.	Three samples of limonitic material contained anomalous amounts of lead and zinc (Kuizon and Lipton, 1989).
722	BC No. 53 (T7N, R29E, sec. 35) Paul Yearsley	Northeast-trending shear zones in dolomite contain leached pods of iron and manganese oxides. The pods also contain secondary lead and zinc minerals in remnant limonitic boxworks. The pods are discontinuous and poorly exposed.	One 117-ft adit, one caved shaft, two trenches, and one pit.	Four chip samples of leached material contained 0.01% to 0.28% lead and 0.23% to 1.37% zinc. Two other chip samples of iron-stained dolomite contained anomalous amounts of lead and zinc (Kuizon and Lipton, 1989).

Table A-4.--Mines and prospects in the Lost River Ranger District--Continued

Map No.	Name (Location) Owner/Operator	Geology	Workings and Production	Sample and Resource Data
723	BC No. 65 (T6N, R29E, sec. 2) Paul Yearsley	A fault zone in quartzite contains lenses of iron oxides with siliceous boxworks and secondary lead and zinc minerals. The lenses trend N10°-20°W, dip 70°NE to vertical, and are exposed for as much as 10 ft in length.	One trench and three pits.	Two of four samples contained 0.18% and 0.25% lead, and two contained 0.14% and 1.53% zinc (Kuizon and Lipton, 1989).

APPENDIX B.--Guidelines for mine design and costing

GUIDELINES FOR MINE DESIGN AND COSTING

Mine design and costing comprise the last step of a three-step resource assessment process. Resource assessment follows a logical sequence of events in which potential resources are (1) identified, (2) quantified and qualified (tonnage and grade estimates), and (3) evaluated (gross and net value estimates). Resource identification involves data gathering, deposit modeling, and field investigations aimed at identifying resource indicators. Identification methods include, but are not limited to, geological mapping and sampling; soil and water analyses; seismic, magnetic, or gravity surveys; and borehole drilling or other piercement methods. These data may help to refine an existing deposit model or suggest a new model which can serve as a guide to appropriate methods for further resource identification.

Quantification and qualification of identified resources involves the use of one or more geomathematical methods to arrive at tonnage and grade estimates from sample and other resource data. Estimates include an indicated degree of certainty that results from the reliability of the resource identification methods used. This second step in the assessment process will also provide such information as ore body configuration, orientation, and engineering characteristics.

With these data, estimates of the gross and net values of the deposit can be made. Gross value is estimated from the tonnage and grade of the deposit and an expected unit value for the products. To arrive at an expected net value, mining and recovery costs must be estimated. Estimation of mining costs for an undeveloped deposit requires information such as ore body configuration, rock competency, daily or annual tonnage rates, mining and haulage methods, environmental factors, exploration requirements, prevailing labor rates, and any extreme conditions such as severe weather or remoteness that influence costs.

The first step in estimating mining costs for a deposit is to select an appropriate mining method. Mining is by either surface or underground methods. A mining method must be selected that provides the maximum economic benefit given the restrictions of geometry, geology, and environment; both surface and underground techniques should be considered. Surface mining generally has the lowest associated costs on a per ton basis. Underground mining entails increases in drilling and blasting requirements per ton of ore, limits in the size of ore conveyance equipment, restrictions in haulage routes and speeds, and additional handling and rehandling of the ore. These requirements escalate the production costs per ton, which in turn dictate higher cutoff grades. Higher ore losses are also incurred in underground mining as compared to surface methods. While open pit recovery can approach 95 percent, underground methods such as room and pillar may leave as much as 40 percent of the ore behind. Choice of mining method usually pivots on economics. In some instances, ore is extracted by surface methods down to an economically determined cutoff point, then underground techniques are initiated. Environmental, geographical, personnel, and financial restrictions must be considered in mine design. Although the benefits are often economically intangible, mitigation of environmental impacts may determine the feasibility of mining a given deposit. Mine design in extremely remote areas may be affected by access or the availability of power. Large equipment may prove difficult and expensive to transport to rugged areas. High-draw electrical equipment, such as conveyors, may be eliminated in favor of trucks if electric power is scarce or costly.

The rate at which a deposit is expected to be mined determines applicable mining method and equipment size. A general guide to practical mining rate is given by Taylor's rule:

$$L = 0.2\ (FT)^{0.25}$$

where L = mine life in years, F = ore recovery factor (e.g., if recovery = 90 percent, F = 0.90), and T = total tonnage of ore in the deposit (Taylor, 1977, p. 7; Gosling and others, 1988). Then, assuming 350 operating days per year:

$$X = \frac{(FT)}{L(350)}$$

where X is the tons of ore mined per day. Finally, substituting for L the value given by Taylor's rule, we have

$$X = \frac{(FT)^{0.75}}{70}$$

For example, a 10 million ton deposit at 90 percent recovery would have a mine life of 11 years [$L = 0.2\ (0.90 * 10{,}000{,}000)^{0.25}$]; and a mining rate of 2,350 tons per day [$X = \frac{(0.90 * 10{,}000{,}000)^{0.75}}{70}$].

Surface Mine Design

Surface mining is best suited for large volume deposits occurring near the surface. The most important item that affects the economics of surface mining is stripping ratio (the amount of waste that must be removed to extract each ton of ore). In surface mining, overburden and waste must be removed to expose the ore body. As the depth of mining increases, more waste may need to be removed to extract the same amount of ore due to the outward slope of the pit walls. A point will likely be reached where the cost of removing the ore exceeds its value. Steeply-dipping, narrow vein deposits must be of high grade to justify surface mining. The practical depth limit for a specific deposit is determined by the stripping ratio, ore value, deposit volume, extraction method, mine life, and reclamation requirements. Stripping ratio is directly related to deposit geometry and surface topography. Factors such as weathering, fracturing, rock strength, and ground water all influence the pit wall stability of both ore and waste. Although surface mining techniques can be used in nearly all geologic conditions, pit wall stability determines pit slope which directly affects the production cost per ton and the economic depth of the pit.

For deposits likely to be mined on the Challis National Forest, front-end loaders or diesel shovels and trucks would likely be used for small open pit operations. Electric shovels and trucks or draglines would likely be used in large open pit mines.

Underground Mine Design

If surface mining methods are not feasible, the geometry and geology of a deposit are important factors to consider when chosing an appropriate underground mining method. The deposit's actual or estimated length, width, thickness, strike, dip, continuity, shape, and relation to surface topography are used to develop a mine plan. Ore and wall rock characteristics directly affect mining method selection and subsequent mining costs. Rock competency, for example, determines the amounts of explosives required to achieve optimum fragmentation and the ground support necessary to keep stopes and haulage ways open.

Once geometry and geology of a deposit have been established, the choices of mining method are narrowed to but a few. After environmental, geographical, personnel, and financial factors are considered, the least expensive mining method is selected. Some mining methods require high initial capital investments although production costs may be quite low. For example, the time and money invested in preproduction development in a shrinkage-stoping mine would result in a substantial lag time before receipt of initial revenues. The information given in table B1 will provide general guidelines for determining a mining method.

Table B-1.-- Underground mining methods

Deposit type	Dip	Thickness (ft)	Mining Method	Production rates (ton/day)	Comments
Bedded or vein deposits	<30°	>150	Vertical crater retreat	<2,000 to >20,000	Allows mechanization
	<50°	All	Room and pillar	<200 to >20,000	Inclined or step methods for 30° to 50° dip may limit mechanization
	>45°	All	Cut and fill	<5,000	Highly selective, also used in small irregularly shaped deposits
	>50°	<20	Shrinkage	<5,000	Ore boundaries must be regular, ore recovery delayed
	>50°	>20	Vertical crater retreat	<2,000 to >20,000	Allows mechanization
Massive deposits	Large vertical and horizontal extent		Vertical crater retreat	<2,000 to >20,000	Allows mechanization

Mill Design

Mills for deposits likely to be developed on the Challis National Forest will probably be one of three types: (1) leach, (2) gravity, or (3) flotation or some combination of these. Choice of milling method is based on commodities to be recovered, and ore type and grade. The following mill models are designed to treat low- to medium-grade, gold ores; tungsten oxide ores; high-grade, lead-zinc ores; polymetallic (copper, lead, zinc, gold, and silver) sulfide ores; molybdenum, fluorspar, or other one-product ores; and gold-bearing placers. Applicable ore types for each model are listed in the following section.

Mining and milling costs

Mining, milling, and infrastructure models were derived for deposit types likely to be developed on the Challis National Forest. The cost models were developed by Burton Gosling, Thomas Camm, Nicholas Wetzel, and Scott Stebbins, mining engineers at the USBM, Western Field Operations Center, Spokane, WA. Costs for hard rock mining and milling methods and infrastructure requirements were compiled using actual cost data from operating mines, augmented by the USBM CES (Cost Estimating

System) (U.S. Bureau of Mines, 1987a,b). Infrastructure costs include items such as access roads, camp facilities, and on-site power generation. Placer mine and mill models were constructed after Stebbins (1987). These costs include a 25 percent contingency for unaccounted-for but usually unavoidable expenses unique to each mine project. All costs are escalated to July 1988.

The costs presented in this appendix are order-of-magnitude estimates; actual costs are expected to be within 30 percent less than the estimate or within 50 percent more. More precise costs can be estimated using the CES or the methods of Stebbins (1988). Budget planning or definitive estimates can be calculated for specific projects where sufficient information is available and reasonable estimates can be made. Additional guidelines and costs for itemized engineering estimates are available from Hustrulid (1982), Weiss (1985), Dataquest, Inc. (1989), Schumacher (1989), R.S. Means Company, Inc. (1988), Caterpillar Tractor Company (1986), Richardson Engineering Services, Inc. (1984) and other engineering references.

The costs shown in tables 18, 19, and 20 of this report were derived from the following cost model equations. Once mining and milling methods have been selected for a particular deposit, the full cost of a mining activity can be estimated by applying appropriate mining, milling, and infrastructure models based on resource tonnage or daily capacity, and deposit depth. For each model, two series of equations are provided, one equation for each component of the capital and operating costs. The known quantities are substituted into the equations, giving the cost for each component. Then, by summing the component costs, the total capital cost in dollars and operating cost in dollars per metric ton may be computed. The cost equations are maintained in the component form to facilitate updating the equations to reflect changing costs. Factors for updating these components are regularly compiled by the USBM and are available at the Western Field Operations Center, Spokane, WA.

Table B-2.--Open pit mine cost model

Small Tonnage (Capacity range 1,000 to 10,000 mt/d ore and waste)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$71458.0(X)^{0.5145}$	$51.27(X)^{-0.3361}$
Equipment	$199422.0(X)^{0.4449}$	$6.62(X)^{-0.1399}$
Steel	$3379.0(X)^{0.5054}$	$9.66(X)^{-0.4797}$
Fuel	$8860.0(X)^{0.5737}$	$27.92(X)^{-0.4245}$
Chemical	$11506.0(X)^{0.5055}$	$35.08(X)^{-0.4930}$
Industrial materials	$171.0(X)^{0.6031}$	$2.8028(X)^{-0.3947}$
Construction materials	$117157.0(X)^{0.3290}$	NA

Large Tonnage (Capacity range 10,000 to 100,000 mt/d ore and waste)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$40548.0(X)^{0.5263}$	$57.44(X)^{-0.4045}$
Equipment	$70053.0(X)^{0.5526}$	$1.5560(X)^{-0.00122}$
Steel	$18.95(X)^{0.9764}$	$0.0794(X)^{-0.04153}$
Fuel	$2042.0(X)^{0.6094}$	$6.1071(X)^{-0.4065}$
Chemical	$174.8(X)^{0.8906}$	$0.4242(X)^{-0.0931}$
Industrial materials	$144.2(X)^{0.6219}$	$2.4066(X)^{-0.3782}$
Construction materials	$38622.0(X)^{0.4505}$	NA

X = Total metric tons of ore and waste mined daily
NA = Not applicable

Applicable to deposits with stripping ratios (waste:ore) greater than 0.2:1; ore and waste assumed to have the same specific gravity.

Table B-3.--Room and pillar mine cost model
(Capacity range 50 to 20,000 mt/d)

Adit Entry

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$6970.0(T)^{0.3544}$	$84.753(T)^{-0.1618}$
Equipment	$21333.2(T)^{0.3990}$	$2.634(T)^{-0.0880}$
Steel	$5581.0(T)^{0.3205}$	$3.700(T)^{-0.0745}$
Lumber	$19.7(T)^{0.4080}$	$0.010(T)^{-0.0681}$
Fuel	$818.0(T)^{0.3217}$	$1.840(T)^{-0.0936}$
Industrial materials	$7451.0(T)^{0.3250}$	$6.804(T)^{-0.0743}$
Construction materials	$1534.4(T)^{0.4001}$	$0.044(T)^{-0.0733}$

Shaft Entry

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$6970(T)^{0.3544} + 2735(d)$	$84.753(T)^{-0.1618}$ $+1.01$
Equipment	$21333.2(T)^{0.3990} + 6,180,000$ $+ 1442(d)$	$2.634(T)^{-0.0880}$ $+0.001(d)$
Steel	$5581(T)^{0.3205} + 356(d)$	$3.700(T)^{-0.0745}$
Lumber	$19.7(T)^{0.4080} + 9(d)$	$0.010(T)^{-0.0681}$
Fuel	$818.0(T)^{0.3217} + 219(d)$	$1.840(T)^{-0.0936}$ $+ 0.0003(d)$
Industrial materials	$7451.0(T)^{0.3250} + 302(d)$	$6.804(T)^{-0.0743}$
Construction materials	$1534.4(T)^{0.4001} + 288(d)$	$0.044(T)^{-0.0733}$ $+0.18$

T = Total resources in metric tons
d = depth of shaft in meters

This model assumes the use of jumbo drills for production and drift development, rock bolts for wall support, and front-end loaders, trucks and scoop trams for ore transport.

Table B-4.--Cut and fill mine cost model

Adit entry

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$1655.1(T)^{0.5033}$	$1298.5(T)^{-0.2365}$
Equipment	$63773.0(T)^{0.3589}$	$261.6(T)^{-0.3653}$
Steel	$37.6(T)^{0.5362}$	$809.2(T)^{-0.4049}$
Lumber	$19.0(T)^{0.4533}$	$2.33(T)^{-0.0417}$
Fuel	$7.0(T)^{0.4909}$	$54.5(T)^{-0.3279}$
Industrial materials	$88.3(T)^{0.5311}$	$4.71(T)^{-0.0939}$
Construction materials	$1842.7(T)^{0.4726}$	$16.3(T)^{-0.1295}$

Shaft Entry

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$1655.1(T)^{0.5033} + 2735(d)$	$1298.5(T)^{-0.2365} + 1.01$
Equipment	$63773(T)^{0.3589} + 6{,}180{,}000 + 1442(d)$	$261.6(T)^{-0.3653} + 0.001(d)$
Steel	$37.6(T)^{0.5362} + 356(d)$	$809.2(T)^{-0.4049}$
Lumber	$19.0(T)^{0.4533} + 9(d)$	$2.33(T)^{-0.0417}$
Fuel	$7.0(T)^{0.4909} + 219(d)$	$54.5(T)^{-0.3279} + 0.0003(d)$
Industrial materials	$88.3(T)^{0.5311} + 302(d)$	$4.71(T)^{-0.0939}$
Construction materials	$1842.7(T)^{0.4726} + 288(d)$	$16.3(T)^{-0.1295} + 0.18$

T = Total resources in metric tons
d = depth in meters

This model assumes the use of jackleg and stoper drills for production and small jumbos for drift development; slushers are used to move ore in stopes, and LHD's (a vehicle which loads, hauls, and dumps) are used in haulage ways.

Table B-5.--Vertical crater retreat mine cost model
(Capacity range 500 to 20,000 mt/d)

Adit Entry

Cost Component	Capital Cost Equation($)	Operating Cost Equation ($/mt)
Labor	$2105.921(T)^{0.4892}$	$232.269(T)^{-0.2270}$
Equipment	$3671.263(T)^{0.5081}$	$5.418(T)^{-0.1546}$
Steel	$30.882(T)^{0.5546}$	$0.703(T)^{-0.0054}$
Lumber	$1.045(T)^{0.6791}$	$0.150(T)^{-0.0208}$
Fuel	$4.555(T)^{0.5261}$	$8.090(T)^{-0.1817}$
Industrial materials	$69.819(T)^{0.5520}$	$3.720(T)^{-0.0314}$
Construction materials	$2614.668(T)^{0.4502}$	$9.649(T)^{-0.1328}$

Shaft Entry

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$2105.921(T)^{0.4892}+2735(d)$	$232.269(T)^{-0.2270} + 1.01$
Equipment	$3671.263(T)^{0.5081}+6,180,000 + 1442(d)$	$5.418(T)^{-0.1546} + 0.001(d)$
Steel	$30.882(T)^{0.5546}+356(d)$	$0.703(T)^{-0.0054}$
Lumber	$1.045(T)^{0.6791}+ 9(d)$	$0.150(T)^{-0.0208}$
Fuel	$4.555(T)^{0.5261}+ 219(d)$	$8.090(T)^{-0.1817} + 0.0003(d)$
Industrial materials	$69.819(T)^{0.5520}+302(d)$	$3.720(T)^{-0.0314}$
Construction materials	$2614.668(T)^{0.4502}+ 288(d)$	$9.649(T)^{-0.1328} + 0.18$

T = Total resource in metric tons
d = depth of shaft

This model assumes the use of down-the-hole and jumbo drills for production and drift development; rock bolts are used for wall support. Front-end loaders, trucks, and scoop trams are used for ore transport

Table B-6.--Shrinkage stope mine cost model (Capacity range 50 to 3,270 mt/d)

Adit Entry

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$5107.52(T)^{0.4286}$	$67.102(T)^{-0.2654}$
Equipment	$15204.52(T)^{0.4114}$	$10.884(T)^{-0.1954}$
Steel	$143.88(T)^{0.4737}$	$8.706(T)^{-0.1508}$
Lumber	$12.27(T)^{0.6042}$	$6.763(T)^{-0.1978}$
Fuel	$36.95(T)^{0.3844}$	$12.358(T)^{-0.2076}$
Industrial materials	$470.63(T)^{0.4319}$	$15.274(T)^{-0.1136}$
Construction materials	$4440.81(T)^{0.4123}$	$37.563(T)^{-0.2107}$

Shaft Entry

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$5107.52(T)^{0.4286} + 2735(d)$	$467.102(T)^{-0.2654} + 1.01$
Equipment	$15204.52(T)^{0.4114} + 6{,}180{,}000 + 1442(d)$	$10.884(T)^{-0.1954} + 0.001(d)$
Steel	$143.88(T)^{0.4737} + 356(d)$	$8.706(T)^{-0.1508}$
Lumber	$12.27(T)^{0.6042} + 9(d)$	$6.763(T)^{-0.1978}$
Fuel	$36.95(T)^{0.3844} + 219(d)$	$12.358(T)^{-0.2076} + 0.0003(d)$
Industrial materials	$470.63(T)^{0.4319} + 302(d)$	$15.274(T)^{-0.1136}$
Construction materials	$4440.81(T)^{0.4123} + 288(d)$	$37.563(T)^{-0.2107} + 0.18$

T = Total resource in metric tons
d = depth of shaft in meters

This model assumes the use of jackleg and stoper drills for production and drift development, rock bolts for wall support, and LHD's for ore transport.

Table B-7.--Placer mine cost model
(Capacity range 100 to 10,000 mt/d)

Stripping ratio 1:1

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$216.425(T)^{0.3413}$	$200.605(T)^{-0.4173}$
Equipment	$5316.233(T)^{0.2729}$	$5.612(T)^{-0.2105}$
Steel	$0.146(T)^{0.5281}$	NA
Fuel	$2.636(T)^{0.5276}$	$9.342(T)^{-0.2405}$
Construction materials	$2.797(T)^{0.4192}$	NA

Stripping ratio other than 1:1

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$217.292(T)^{0.3413}(S)^{0.2432}$	$197.210(T)^{-0.2270}(S)^{0.0856}$
Equipment	$5236.475(T)^{0.2729}(S)^{0.7076}$	$5.427(T)^{-0.2105}(S)^{0.4739}$
Steel	$0.147(T)^{0.5281}(S)^{0.2670}$	NA
Fuel	$2.652(T)^{0.5276}(S)^{0.2670}$	$9.043(T)^{-0.2405}(S)^{0.4565}$
Construction materials	$2.797(T)^{0.4193}$	NA

T = Total resource in metric tons
S = Stripping ratio (waste:ore)

This model assumes the use of bulldozers to move pay gravel to the plant and overburden to the spoil pile.

Table B-8.--Mine infrastructure cost model

Surface mine (Capacity range 1,000 to 100,000 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$348061.3(X)^{0.4158}$	$73.81(X)^{-0.6333}$
Equipment	$64505.7(X)^{0.5365}$	$11.30(X)^{-0.4138}$
Steel	$42784.7(X)^{0.0462}$	$7.37(X)^{-1.0074}$
Fuel	$22129.6(X)^{0.4396}$	$15.05(X)^{-0.3360}$
Chemical	$17551.4(X)^{0.4620}$	$6.95(X)^{-0.2611}$
Industrial materials	$8589.7(X)^{0.4485}$	$72.04(X)^{-0.5522}$
Construction materials	$212243.0(X)^{0.4833}$	NA

Small Underground Mine (Capacity range 200 to 5,000 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$288679.2(X)^{0.5241}$	$88.01(X)^{-0.5753}$
Equipment	$117340.4(X)^{0.5013}$	$19.34(X)^{-0.4469}$
Steel	$54189.3(X)^{0.0153}$	NA
Fuel	$91866.8(X)^{0.2461}$	$46.28(X)^{-0.4419}$
Chemical	$89276.4(X)^{0.2388}$	$8.04(X)^{-0.2706}$
Industrial materials	$3637.9(X)^{0.5775}$	$15.19(X)^{-0.4227}$
Construction materials	$194013.5(X)^{0.5742}$	NA

Large Underground Mine (Capacity range 2,000 to 50,000 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$288980.0(X)^{0.4916}$	$91.81(X)^{-0.6118}$
Equipment	$114255.2(X)^{0.5050}$	$17.89(X)^{-0.4453}$
Steel	$53066.3(X)^{0.0186}$	NA
Fuel	$84037.9(X)^{0.2597}$	$44.33(X)^{-0.4357}$
Chemical	$80975.0(X)^{0.2537}$	$8.00(X)^{-0.2698}$
Industrial materials	$3115.1(X)^{0.5587}$	$47.11(X)^{-0.4411}$
Construction materials	$180573.3(X)^{0.5529}$	NA

X = Metric tons of ore mined daily

Table B-9.--Carbon-in-pulp gold leach mill cost model (Capacity range 50 to 20,000 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$57465.69(X)^{0.674}$	$387.220(X)^{-0.565}$
Equipment	$81215.07(X)^{0.661}$	$4.123(X)^{-0.146}$
Steel	$26122.46(X)^{0.599}$	$0.611(X)^{-0.028}$
Fuel	$1.25(X)^{1.408}$	$6.654(X)^{-0.520}$
Industrial materials	$0.402(X)^{1.417}$	$29.047(X)^{-0.412}$
Construction materials	$32560.19(X)^{0.652}$	$0.096(X)^{-0.002}$

X = Metric tons of ore mined daily

Applicable to deposits grading 0.09 to 0.7 oz/ton gold (3 to 24 g/mt); this mill is expected to recover 90 percent of the gold in the mill feed and 61 percent of the silver.

Table B-10.--Heap leach mill cost model (Capacity range 200 to 10,000 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$4308.03(X)^{0.861}$	$68.500(X)^{-0.386}$
Equipment	$2032.06(X)^{0.894}$	$6.742(X)^{-0.292}$
Steel	$617.07(X)^{0.854}$	$0.022(X)^{-0.307}$
Fuel	$42.10(X)^{0.935}$	$5.393(X)^{-0.429}$
Industrial materials	$11.93(X)^{0.954}$	$21.326(X)^{-0.405}$
Construction materials	$828.91(X)^{0.983}$	$0.271(X)^{-0.088}$

X = Metric tons of ore mined daily

Applicable to deposits containing less than 0.09 oz/ton gold; expected recovery includes 70 percent of the gold in the mill feed and 45 percent of the silver.

Table B-11.--Tungsten oxide gravity mill cost model
(Capacity range 50 to 500 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$56817.5(X)^{0.5437}$	$103.918(X)^{-0.3835}$
Equipment	$71412.0(X)^{0.5086}$	$23.347(X)^{-0.4079}$
Steel	$22062.5(X)^{0.5151}$	$1.580(X)^{-0.1099}$
Fuel	$6938.4(X)^{0.55}$	$1.131(X)^{-0.3966}$
Industrial materials	$995.6(X)^{0.6777}$	$0.236(X)^{-0.0}$
Construction materials	$13712.2(X)^{0.5741}$	NA

X = Metric tons of ore mined daily

Applicable to deposits containing about 1.5 percent WO_3; expected final concentrates would contain 60 percent WO_3 for an 86 percent circuit recovery.

Table B-12.--Tungsten oxide flotation mill cost model
(Capacity range 500 to 5,000 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$16962.9(X)^{0.7745}$	$370.312(X)^{-0.5552}$
Equipment	$35938.8(X)^{0.659}$	$5.182(X)^{-0.2065}$
Steel	$11530.8(X)^{0.659}$	$1.600(X)^{-0.1391}$
Fuel	$1630.6(X)^{0.819}$	$0.736(X)^{-0.3591}$
Industrial materials	$102.6(X)^{1.072}$	$4.479(X)^{-0.0}$
Construction materials	$3010.4(X)^{0.852}$	NA

X = Metric tons of ore mined daily

Applicable to deposits containing 0.5 percent WO_3; concentrates are expected to contain 15 percent WO_3 for a circuit recovery of 88 percent.

Table B-13.--One-product flotation mill cost model
(Capacity range 400 to 20,000 mtcd)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$13545.6(X)^{0.8016}$	$217.4(X)^{-0.6137}$
Equipment	$23003.8(X)^{0.6996}$	$22.4(X)^{-0.3257}$
Steel	$4099.4(X)^{0.8157}$	$0.041(X)^{-0.1101}$
Fuel	$903.6(X)^{0.8288}$	$1.39(X)^{-0.3168}$
Industrial materials	$492.2(X)^{0.7362}$	$0.738(X)^{-0.0}$
Construction materials	$3278.2(X)^{0.8224}$	NA

X = Metric tons of ore mined daily

Applicable to deposits with one commodity to be recovered, such as molybdenum

Table B-14.--Lead-zinc flotation mill cost model
(Capacity range 50 to 20,000 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$13641.2(X)^{0.817}$	$266.344(X)^{-0.609}$
Equipment	$23121.4(X)^{0.716}$	$25.602(X)^{-0.332}$
Steel	$4554.0(X)^{0.830}$	$0.038(X)^{-0.084}$
Fuel	$2965.3(X)^{0.845}$	$2.212(X)^{-0.297}$
Industrial materials	$606.0(X)^{0.727}$	$0.618(X)^{-0.0}$
Construction materials	$3264.7(X)^{0.839}$	NA

X = Metric tons of ore mined daily

Applicable to deposits containing 4.0 percent to 9.0 percent lead and 6.0 percent to 12.0 percent zinc, primarily in silver-bearing galena and sphalerite. Expected recovery is 95 percent of the lead in the mill feed, 83.5 percent of the zinc, and 95 percent of the silver.

Table B-15.--Polymetallic sulfide flotation mill cost model
(Capacity range 50 to 10,000 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$15537.70(X)^{0.813}$	$199.574(X)^{-0.583}$
Equipment	$25352.59(X)^{0.725}$	$28.249(X)^{-0.330}$
Steel	$5117.05(X)^{0.826}$	$0.036(X)^{-0.082}$
Fuel	$1757.55(X)^{0.840}$	$2.310(X)^{-0.272}$
Industrial materials	$673.80(X)^{0.735}$	$0.673(X)^{-0.0}$
Construction materials	$3689.46(X)^{0.834}$	NA

x = Metric tons of ore mined daily

Applicable to deposits containing combinations of copper, lead, and zinc in sulfide minerals with minor amounts of gold and silver. This mill is expected to recover 88 percent of the lead in the mill feed, 85 percent of the zinc, 85 percent of the copper, 78 percent of the gold, and 73 percent of the silver.

Table B-16.--Placer mill cost model
(Capacity range 500 to 20,000 mt/d)

Cost Component	Capital Cost Equation ($)	Operating Cost Equation ($/mt)
Labor	$1983.582(T)^{0.2578}$	$22.002(T)^{-0.2400}$
Equipment	$5311.665(T)^{0.2220}$	$1.682(T)^{-0.0938}$
Steel	$3.763(T)^{0.2207}$	NA
Fuel	$142.784(T)^{0.2804}$	$1.150(T)^{-0.1059}$
Construction materials	$654.707(T)^{0.2460}$	$0.188(T)^{-0.1909}$

T = total resources

Applicable to deposits containing at least 0.005 oz/ton gold; expected recovery is about 95 percent of the gold in the mill feed.

APPENDIX C.--Commodity summaries

COMMODITY SUMMARIES

The following commodity summaries give background information concerning the uses, prices, and relative U.S. import/export positions on certain minerals or commodities found in the Challis National Forest. The data comes, in most cases, from the U.S. Bureau of Mines (1990) annual publication Mineral Commodity Summaries. Additional data comes from Worl and others (1989), and Engineering and Mining Journal (1990).

Antimony

U.S. domestic production, 1989	Withheld
Estimated U.S. production, 1990	Withheld
U.S. production as a % of world production	Not reported
U.S. domestic reserves	82,000 mt
U.S. reserves as a % of world reserves	2%
U.S. domestic consumption	39,500 mt
U.S. consumption as a % of world production	48%
U.S. net import reliance as % of consumption	60%

Import sources:
China 44%, Republic of South Africa 14%, Mexico 13%

Price (Cents per pound):

Yr	1989	1988	1987	1986	1985
	99.0	103.9	110.6	121.9	131.1

Primary uses by industry:
Flame retardants 70%, transportation, batteries 10%, chemicals 10%

Issues:

The estimated value of domestic antimony production from six companies in 1989 is $62 million. China was the main source for foreign supplies. Domestic antimony production was largely derived from recycling of lead-antimony batteries. Recycling and domestic mine output supplied about one-half of domestic demand.

Environmental concerns associated with the processing of antimony are minimal as emissions and effluents are largely controlled at the processing plants.

Arsenic

U.S. domestic production, 1989	None
Estimated U.S. production, 1990	None
U.S. production as a % of world production	0%
U.S. domestic reserves	50,000 mt
U.S. reserves as a % of world reserves	5%
U.S. domestic consumption	24,000 mt
U.S. consumption as a % of world production	44%
U.S. net import reliance as % of consumption	100%

Import sources:
France 22%, Sweden 19%, Mexico 17%, Canada 10%

Price (Cents per pound):

Yr	1989	1988	1987	1986	1985
	26.0	30.0	44.0	44.0	42.0

Primary uses by industry:
Wood preservatives 70%, agricultural chemicals 22%, glass 4%

Issues:

World resources of copper, lead, and gold contain substantial resources of arsenic. Arsenic trioxide prices have fallen 41% since 1987 because world production, primarily from France and Chile, has exceeded demand. Arsenic content of metal ores creates environmental problems both for smelter workers during the processing of these ores and in disposal of arsenic containing wastes.

Consumption of arsenic in the United States increased about 8% in 1989. Arsenic trioxide was refined from imported low-grade arsenic resources and converted to arsenic acid by three companies in the United States in 1989. Most exports of arsenic compounds were shipped to Canada. The total value of arsenic consumed during 1989 in the U.S. was about $20 million.

Barite

U.S. domestic production, 1989	387,000 tons
Estimated U.S. production, 1990	500,000 tons
U.S. production as a % of world production	7%
U.S. domestic reserves	30,000,000 tons
U.S. reserves as a % of world reserves	18%
U.S. domestic consumption	1,678,000 tons
U.S. consumption as a % of world production	32%
U.S. net import reliance as % of consumption	77%

Import sources:
China 61%, India 16%, Morocco 11%

Price (Dollars per ton):

Yr	1989	1988	1987	1986	1985
$	40.91	34.86	35.32	41.50	29.09

Primary uses by industry:
Oil- and gas-well drilling fluid 80%, paint, rubber, glass, and chemicals 15%

Issues:
Consumption and price of barite both move, to a large degree, directly in response to the amount of oil- and gas-well drilling activity worldwide. Domestic barite production continued to decline for the eighth consecutive year in 1989. Imports of lower cost foreign barite exceeded domestic production for the eighth straight year. Estimated 1990 consumption is 2.0 million tons.

Beryllium

U.S. domestic production, 1989	205 tons
Estimated U.S. production, 1990	205 tons
U.S. production as a % of world production	54%
U.S. domestic reserves	20,000 mt
U.S. reserves as a % of world reserves	Not reported
U.S. domestic consumption	260 mt
U.S. consumption as a % of world production	69%
U.S. net import reliance as % of consumption	23%

Import sources:

Brazil 57%, China 19%, France 15%, Republic of South Africa 1%

Price: (Dollars per pound, domestic metal ingot):

Yr	1989	1988	1987	1986	1985
$	225.0	225.0	225.0	225.0	225.0

Primary uses by industry:

Alloy and metal in aerospace and defense components 23%, alloy and oxide in electrical equipment 17%, alloy and oxide in electronic equipment 35%

Issues:

Bertrandite ore was mined by one company in Utah in 1989. Beryllium alloys continued to be the most widely used products and their use in the automotive electronics, telecommunications, fiber optics, and aircraft bearings and skins applications increased in 1989. Because of the relatively high price of beryllium, uses are expected to continue to be principally in applications that require light weight, high strength, and high thermal conductivity.

Bismuth

U.S. domestic production, 1989	Withheld
Estimated U.S. production, 1990	Withheld
U.S. production as a % of world production	Not reported
U.S. domestic reserves	9,000 mt
U.S. reserves as a % of world reserves	10%
U.S. domestic consumption	1,400 mt
U.S. consumption as a % of world production	42%
U.S. net import reliance as % of consumption	Withheld

Import sources:
Mexico 29%, Belgium 26%, Peru 15%, United Kingdom 12%

Price (Dollars per pound):

Yr	1989	1988	1987	1986	1985
$	5.56	5.78	3.65	3.25	5.18

Primary uses by industry:
Pharmaceuticals and chemicals 44%, primary metal industries 32%, fusible alloys and solder 23%.

Issues:
Primary production of bismuth in the United States increased slightly in 1989, while the single producing plant continued to operate well below its capacity of 1.1 million pounds. Consumption of bismuth decreased slightly in 1989. Research continued to develop a bismuth-strontium-copper-calcium-oxygen compound for use as a high-temperature superconductor. Reported domestic consumption of bismuth in 1989 was valued at $17.2 million.

Cobalt

U.S. domestic production, 1989	None
Estimated U.S. production, 1990	None
U.S. production as a % of world production	0%
U.S. domestic reserves	Unknown
U.S. reserves as a % of world reserves	NA
U.S. domestic consumption	7,600 mt
U.S. consumption as a % of world production	20%
U.S. net import reliance as % of consumption	86%

Import sources:
Zaire 31%, Zambia 21%, Canada 21%, Norway 10%

Price (Dollars per pound):

Yr	1989	1988	1987	1986	1985
$	7.65	7.09	6.56	7.49	11.43

Primary uses by industry:
Aircraft engines 40%, paint driers 12%, magnetic alloys 12% catalysts 8%

Issues:
Although large, most domestic resources are in subeconomic concentrations that will not be economically usable in the foreseeable future. Most identified world cobalt resources are in nickel-bearing laterites, with most of the rest in nickel-copper sulfides. Millions of tons of speculative cobalt resources exist in manganese nodules and crusts in the ocean floor. Demand for cobalt increased slightly in 1989 with prices remaining stable. Surplus market conditions are expected to prevail in 1990, with most of the surplus in producers stocks.

Copper

U.S. domestic production, 1989	1,500,000 mt
Estimated U.S. production, 1990	1,500,000 mt
U.S. production as a % of world production	17%
U.S. domestic reserves	57,000,000 mt
U.S. reserves as a % of world reserves	16%
U.S. domestic consumption	2,250,000 mt
U.S. consumption as a % of world production	25%
U.S. net import reliance as % of consumption	9%

Import sources:
Canada 42%, Chili 29%, Peru 6%, Zaire 6%

Price (Cents per pound):

Yr	1989	1988	1987	1986	1985
	132.0	120.5	82.5	66.0	67.0

Primary uses by industry:
Construction 42%, electrical and electronic 23%, industrial equipment 14%, transportation 12%

Issues:

Sustained higher prices since late 1987 prompted reopening several long-closed mines in the U.S. In addition, further expansion of electrowinning capacity was announced. U.S. import reliance decreased from 13% in 1988 as domestic production increased. In 1990, U.S. apparent consumption of copper is estimated at 2.3 million mt. Domestic mine production in 1990 is estimated at 1.5 million mt at a value of $4.4 billion.

As a result of constrained world copper production, and record world consumption, the gap between supply and demand is expected to maintain tight supply through 1990.

Fluorspar

U.S. domestic production, 1989	70,000 tons
Estimated U.S. production, 1990	70,000 tons
U.S. production as a % of world production	1%
U.S. domestic reserves	Withheld
U.S. reserves as a % of world reserves	Not available
U.S. domestic consumption	760,000 mt
U.S. consumption as a % of world production	13%
U.S. net import reliance as % of consumption	91%

Import sources:
Mexico 50%, Republic of South Africa 29%, China 7%

Price (Dollars per ton, Acid-spar):

Yr	1989	1988	1987	1986	1985
$	168-173	173	173	173	173

Primary uses by industry:
Hydrofluoric acid (processing of aluminum, fluorochemicals and uranium) 70%, flux in steel making 25%

Issues:

World fluorspar production and consumption were 20% to 25% below capacity in 1989. Current prices for imported fluorspar and the cost of freight between known domestic deposits and major consumers made many domestic fluorspar deposits uneconomical for development and production.

The Montreal Protocol, which will restrict the consumption and production of chlorofluorocarbons (CFC's) by two thirds of the world nations will have an uncertain impact on fluorspar production, but could cause an eventual increase because substitutes for CFC's have higher fluorine content than those currently in use.

The fluorspar districts in Idaho, and the Western United States are all inactive. Development of fluorspar properties in Idaho would require a major change in the supply and demand of fluorspar (Worl and others, 1989).

Garnet, Industrial

U.S. domestic production, 1989	43,930 tons
Estimated U.S. production 1990	43,920 tons
U.S. production as a % of world production	43%
U.S. domestic reserves	5,000,000 tons
U.S. reserves as a % of world reserves	Not available
U.S. domestic consumption	40,070 tons
U.S. consumption as a % of world production	39%
U.S. net import reliance as % of consumption	Net exporter

Import sources:
- Australia 100%

Price (Dollars per ton):

Yr	1989	1988	1987	1986	1985
$	60-2,000	60-2,000	45-1,200	10-1,200	70-1,200

Primary uses by industry:

Abrasives in transport manufacturing 50%, filtration media 30%, finishing wood furniture 10%

Issues:

In 1989, garnet was produced by four U.S. firms with a total value of $9.8 million. Imports from Australia and test lots from China, India, and Turkey were used in U.S. industry in 1989. It appears that the market is large enough to absorb imports without harming U.S. producers.

Garnet occurs in a large variety of rocks all over the world. Significant resources of garnet occur in Idaho, New Hampshire, and North Carolina. World resources of garnet are large.

Gold

U.S. domestic production, 1989	240 mt
Estimated U.S. production, 1990	275 mt
U.S. production as a % of world production	13%
U.S. domestic reserves	4840 mt
U.S. reserves as a % of world reserves	12%
U.S. domestic consumption	110 mt
U.S. consumption as a % of world production	6%
U.S. net import reliance as % of consumption	Not available

Import sources:
Canada 49%, Switzerland 14%, Uruguay 8%

Price (Dollars per troy ounce):

Yr	1989	1988	1987	1986	1985
$	385.00	438.31	447.95	368.24	317.66

Primary uses by industry:
Jewelry and arts 58%, industrial (electronic) 35%, dental 7%

Issues:

The United States is usually a net importer of gold; however, large unreported investor stock changes preclude calculation of a meaningful net import reliance. Total world gold resources are estimated at 74,600 mt. The Republic of South Africa has about half of the world resources and Brazil, the U.S.S.R., and the United States have about 12% each.

Domestic gold mines continued to produce at record levels during 1989. Two dozen new mines opened during 1989 and many other mines expanded their capacity or were under construction. Several hundred domestic lode and 12 placer mines produced gold valued at $3.0 billion in 1989. Twenty-five mines yielded about 75% of the gold produced and 16 mines accounted for 65% of production. Recently there is a trend toward production being concentrated under a relatively small group of major producers.

The important gold production in the Western United States and much of the world is from large tonnage, low-grade deposits. Environmental pollution abatement continued to be of concern to domestic gold producers.

Graphite

U.S. domestic production, 1989	Withheld
Estimated U.S. production, 1990	Withheld
U.S. production as a % of world production	Not available
U.S. domestic reserves	Very small
U.S. reserves as a % of world reserves	Not available
U.S. domestic consumption	Withheld
U.S. consumption as a % of world production	Not available
U.S. net import reliance as % of consumption	Withheld

Import sources:
Mexico 41%, China 27%, Brazil 11%, Madagascar 7%

Price (Dollars per ton):

Yr	1989	1988	1987	1986	1985
Flake	720	675	712	648	536
Lump	924	758	811	932	790
Amorphous	55	44	52	49	50

Primary uses by industry:
Refractories 23%, brake linings 16%, foundry molds 14%, lubricants 13%, pencils 7%, steel making 5%

Issues:
Natural graphite is consumed domestically by several hundred manufacturing firms, primarily in the Great Lakes regions. Demand is met almost entirely from foreign suppliers. Imports of all kinds of graphite were down slightly in 1989. Domestic resources are very small. Known deposits in Alabama, Alaska, New York, Pennsylvania, and Texas were not economically viable in 1989.

Ilmenite

U.S. domestic production, 1989	Withheld
Estimated U.S. production, 1990	Withheld
U.S. production as a % of world production	Not available
U.S. domestic reserves	7,600,000 mt
U.S. reserves as a % of world reserves	4%
U.S. domestic consumption	700,000 mt
U.S. consumption as a % of world production	19%
U.S. net import reliance as % of consumption	Withheld

Import sources:

Australia 49%, Canada 25%, Republic of South Africa 22%

Price (Dollars per metric ton ilmenite ;Domestic 54% TiO_2):

Yr	1989	1988	1987	1986	1985
$	Not avail.	Not avail.	53.0	53.0	53.0

Primary uses by industry:

Four titanium pigment producers used 99% of the ilmenite and titanium slag consumed. The rest was used in welding rod coatings, manufacturing metal, alloys, and chemicals

Issues:

Two domestic firms produced ilmenite concentrate from three heavy mineral sand operations in Florida. Based on average prices, the value of reported U.S. ilmenite and titanium slag consumption in 1989 totaled $140 million. Major coproducts from sand deposits are zircon and rutile. Estimated domestic consumption of TiO_2 in Ilmenite in 1989 is estimated at 720,000 mt.

Environmental problems related to ilmenite production include (1) land use conflicts where heavy mineral sands exist, and (2) the potential for water pollution from pigment-producing processes that use ilmenite.

Due to the continued high worldwide demand for raw materials to manufacture TiO_2 pigments, several new heavy mineral sand deposits are being developed throughout the world.

Iron Ore

U.S. domestic production, 1989	58,700,000 mt
Estimated U.S. production, 1990	59,000,000 mt
U.S. production as a % of world production	6%
U.S. domestic reserves	16,100,000 mt
U.S. reserves as a % of world reserves	11%
U.S. domestic consumption	87,200,000 mt
U.S. consumption as a % of world production	9%
U.S. net import reliance as % of consumption	20%

Import sources:
Canada 49%, Brazil 21%, Venezuela 15%, Liberia 7%

Price (Cents per long ton unit of Fe, pellets):

Yr	1989	1988	1987	1986	1985
	58.0-74.0	58.0-86.9	58.0-86.9	58.0-86.9	58.0-86.9

Primary uses by industry:
98% blast furnaces, steel production

Issues:

Iron ore was produced by 21 domestic companies in 1989 at a value of about $1.7 billion. Domestic steel companies controlled about 76% of production. About 97% of production was pelletized before shipment.

The iron ore industry of the United States and Canada has undergone a restructuring since 1985 aimed at lowering pellet costs and improving financial performance. In the United States pellet production has risen more than 20% since 1987.

In 1987, steel demand began to grow in response to improving economic conditions. However, the world supply of iron ore continues to exceed demand. Since 1985, several high-cost exporters have lost market share to new mines in Brazil, India and Venezuela.

Lead

U.S. domestic production, 1989	450,000 mt
Estimated U.S. production, 1990	400,000 mt
U.S. production as a % of world production	13%
U.S. domestic reserves	11,000,000 mt
U.S. reserves as a % of world reserves	16%
U.S. domestic consumption	1,220,000 mt
U.S. consumption as a % of world production	35%
U.S. net import reliance as % of consumption	8%

Import sources:
Canada 61%, Mexico 22%, Peru 2%, Australia 2%

Price (Cents per pound):

Yr	1989	1988	1987	1986	1985
	40.0	37.0	35.9	22.0	19.1

Primary uses by industry:
Automotive batteries, gasoline additives and tanks, solders, seals and bearings, 75%, Electrical, electronics, ammunition, TV glass, construction and paint 20%.

Issues:
Estimated world demand reached a record 6.0 million mt in 1989, owing primarily to significant increases in Asia. The value of domestic mine production in 1989, based on the average U.S. producer price was $397 million. Nine lead mines in Missouri plus lead mines in Alaska, Colorado, Idaho and Montana yielded virtually all the total. Domestic mine production of lead in 1990 is expected to increase significantly due to a full year's production from two large new mines in Alaska.

For the first time in several years, U.S. lead smelters received some relief from environmental pressures. Primary plant slags were classified as low-hazard, high-volume waste, and were to be retained in the Bevill exclusion of the Resource Conservation and Recovery Act (RCRA), as amended. At the same time the Environmental Protection Agency was in the final stages of considering a more strict drinking water standard for lead, which could result in severe curtailments of process effluent discharges.

Lime

U.S. domestic production, 1989	17,100,000 tons
Estimated U.S. production, 1990	17,100,000 tons
U.S. production as a % of world production	13%
U.S. domestic reserves	Adequate
U.S. reserves as a % of world reserves	Not available
U.S. domestic consumption	17,254,000 tons
U.S. consumption as a % of world production	13%
U.S. net import reliance as % of consumption	1%

Import sources:

Canada 87%, Mexico 13% for quicklime, hydrated lime and dead-burned dolomite

Price (Dollar per ton):

Yr	1989	1988	1987	1986	1985
$	48.00	47.88	49.96	52.59	51.56

Primary uses by industry:

Leading individual uses for lime were in steel furnaces, water treatment, sulfur removal from stack gasses, construction, and paper and pulp production.

Issues:

In 1989, lime producers at 116 plants in 34 states sold or used lime valued at $823 million. End-use distribution remained about the same as in 1988, with the exception of refractory sales which decreased 42%.

Domestic and world resources of limestone and dolomite suitable for lime manufacture are adequate. It is estimated that in 1990 domestic apparent consumption will be 17.3 million tons.

Manganese

U.S. domestic production, 1989	None
Estimated U.S. production, 1990	None
U.S. production as a % of world production	0%
U.S. domestic reserves	None
U.S. reserves as a % of world reserves	0%
U.S. domestic consumption	740,000 tons
U.S. consumption as a % of world production	3%
U.S. net import reliance as % of consumption	100%

Import sources:
Republic of South Africa 27%, France 14%, Gabon 14%

Price (Dollars per ltu cont. Mn; avg value, 46%-48% Mn):

Yr	1989	1988	1987	1986	1985
$	2.85	1.78	1.29	1.34	1.43

Primary uses by industry:
The largest portion of ore consumption was related to steel production, nonmetallurgical uses are primarily dry cell battery production. Overall manganese uses are construction 32%, machinery 15%, transportation 14%

Issues:
Identified land based resources are large but irregularly distributed with the U.S.S.R. and the Republic of South Africa having about 80% of world resources. Extensive marine accumulations of manganese as oxide in nodules and oxide crusts at shallower depths may have future commercial significance.

Manganese minerals are common in small amounts in many mineral deposits in the forest, but are not present in sufficient quantity to be considered as a potential resource (Worl and others, 1989).

Mercury

U.S. domestic production, 1989	Withheld
Estimated U.S. production, 1990	Withheld
U.S. production as a % of world production	Not available
U.S. domestic reserves	3,000 mt
U.S. reserves as a % of world reserves	2%
U.S. domestic consumption	1,270 mt
U.S. consumption as a % of world production	22%
U.S. net import reliance as % of consumption	Withheld

Import sources:
Spain 34%, China 34%, Turkey 11%, Japan 9%

Price (Dollars per 76 pound flask):

Yr	1989	1988	1987	1986	1985
$	285.00	335.52	295.50	232.79	310.96

Primary uses by industry:
Electrical 35%, electrolytic production of chlorine and caustic soda 33%, paint 15%

Issues:
World mercury resources are estimated at 600,000 mt, principally in Spain, the U.S.S.R., Yugoslavia and Italy. At present rates, sufficient resources are available for about 100 years. In 1989, mercury was produced as a primary product at one U.S. mine and as a byproduct from nine domestic gold mines. The value of mercury consumed in 1989 is estimated at more than $10 million.

Molybdenum

U.S. domestic production, 1989	140,000,000 lb
Estimated U.S. production, 1990	125,000,000 lb
U.S. production as a % of world production	53%
U.S. domestic reserves	6,000,000,000 lb
U.S. reserves as a % of world reserves	49%
U.S. domestic consumption	51,000,000 lb
U.S. consumption as a % of world production	19%
U.S. net import reliance as % of consumption	Net exporter

Import sources:
NA

Price (Dollars per pound):

Yr	1989	1988	1987	1986	1985
$	3.65	3.45	3.30	2.92	3.33

Primary uses by industry:
(Iron and steel producers account for 75% of consumption) machinery 35%, transportation 15%, electrical 15%, chemicals 10%, oil & gas 10%,

Issues:

In 1989, molybdenum production valued at $511 million was produced from 15 domestic mines. Four produced primary molybdenum and 11 recovered byproduct molybdenum. In 1989, the molybdenum market reflected balanced conditions. Resources of molybdenum are adequate to supply world need for the foreseeable future.

U.S. mine output of molybdenum in 1989 increased 47% compared with that of 1988. Reported consumption increased about 4%, exports of molybdenum increased about 62% and U.S. producer inventories remained level when compared with those of 1988.

Due to the price competition of established molybdenum suppliers, the development of molybdenum resources which cannot take advantage of low-cost, high volume mining methods will be impractical. The excess plant capacity of suppliers in the United States and the current level of consumption will make the exploration and development of new resources unlikely in the short term.

Nickel

U.S. domestic production, 1989	None
Estimated U.S. production, 1990	None
U.S. production as a % of world production	NA
U.S. domestic reserves	37,000 tons
U.S. reserves as a % of world reserves	1%
U.S. domestic consumption	160,000 tons
U.S. consumption as a % of world production	30%
U.S. net import reliance as % of consumption (25% of consumption supplied from recycling)	65%

Import sources:

Canada 50%, Norway 15%, Australia 9%, Dominican Republic 6%

Price (Dollars per pound):

Yr	1989	1988	1987	1986	1985
$	6.30	6.09	2.19	1.86	2.26

Primary uses by industry:

Stainless steel 46%, nonferrous alloys 32%, electroplating 20%,

Issues:

Domestic primary nickel consumption in 1989 was down from that of 1988, primarily as a result of a cut in stainless steel production. It is estimated that in 1990, U.S. apparent consumption will be about 180,000 tons and domestic mine production will be zero. World resources in deposits averaging 1% nickel or greater are 143 million tons of nickel. About 80% of this is in laterites and 20% in sulfide deposits. In addition, there are extensive deep sea resources of nickel in manganese nodules and crusts.

Rare-Earth Metals

U.S. domestic production, 1989	14,000 mt REO
Estimated U.S. production, 1990	Above 1989
U.S. production as a % of world production	28%
U.S. domestic reserves	5,500,000 mt REO
U.S. reserves as a % of world reserves	12%
U.S. domestic consumption	Not available
U.S. consumption as a % of world production	Not available
U.S. net import reliance as % of consumption	Not available

Import sources:
Monazite: Australia 75%, Indonesia 10%, Thailand 7%

Price:
Dollars year end 1988: Monazite concentrates, $632 per metric ton; bastnaesite concentrates, $2.43 per kilogram REO content. Prices for processed rare earths, per kilogram: mixed compounds, $2.20 (chloride); high-purity oxides, $22 (lanthanum) to $4,900 (lutetium); metal, $150 (lanthanum) to $14,200 (lutetium); mischmetal, $12.35.

Primary uses by industry:
Industrial consumption was primarily petroleum fluid cracking catalysts, metallurgical additives, ceramics and polishing compounds.

Issues:
In 1989, three companies recovered rare earth minerals in the United States. Bastnaesite was mined in California and monazite in Florida and North Carolina. Thorium and yttrium are byproducts from the recovery of monazite from titanium- and zirconium-bearing heavy mineral sands. Domestic demand for rare earths increased in 1989. The demand pattern continued to shift toward individual compounds and metals and special mixtures, and the capacities to separate these products were increased to meet the demand pattern.

Sand and Gravel, Construction

U.S. domestic production, 1989	888,000,000 tons
Estimated U.S. production, 1990	875,000,000 tons
U.S. production as a % of world production	Not available
U.S. domestic reserves	Not available
U.S. reserves as a % of world reserves	Not available
U.S. domestic consumption	887,400,000 tons
U.S. consumption as a % of world production	Not available
U.S. net import reliance as % of consumption	Net exporter

Import sources:
Canada 77%, Antigua 14%

Price (Dollars per ton):

Yr	1989	1988	1987	1986	1985
$	3.64	3.39	3.35	3.11	3.05

Primary uses by industry:
Aggregate in concrete 26%, road bases and coverings 15%, asphaltic concrete aggregates 9%, construction fill 8%

Issues:

Construction sand and gravel, valued at $3.2 billion was produced from about 5,700 operations in 50 states in 1989. Sand and gravel resources of the world are large. However, due to their geographic distribution, environmental restrictions, and quality requirements, their extraction is sometimes uneconomic. Estimated construction sand and gravel consumption for the United States in 1990 is about 875 million tons.

Due to zoning regulations and land development alternatives, urban shortages in supply are expected to continue to cause a movement of sand and gravel operations away from population centers.

Sand and Gravel, Industrial

U.S. domestic production, 1989	28,300,000 tons
Estimated U.S. production, 1990	88,000,000 tons
U.S. production as a % of world production	Not available
U.S. domestic reserves	Large
U.S. reserves as a % of world reserves	Not available
U.S. domestic consumption	27,500,000 tons
U.S. consumption as a % of world production	Not available
U.S. net import reliance as % of consumption	Net exporter

Import sources:
Antigua 42%, Australia 26%, Japan 11%

Price (Dollars per ton):

Yr	1989	1988	1987	1986	1985
	13.60	13.62	13.00	13.10	12.71

Primary uses by industry:
Glassmaking sand 43%, foundry sand 27%, abrasive sand 7%

Issues:

Industrial sand and gravel, valued at $385 million was produced by 93 companies from 166 operations in 38 states in 1989. Expected 1990 U.S. apparent consumption is 27 million tons.

Due to zoning regulations and land development alternatives, urban shortages in supply are expected to continue to cause a movement of sand and gravel operations away from population centers.

Silicon

U.S. domestic production, 1989	470,000 tons
Estimated U.S. production, 1990	400,000 tons
U.S. production as a % of world production	14%
U.S. domestic reserves	Adequate
U.S. reserves as a % of world reserves	Not available
U.S. domestic consumption	609,000 tons
U.S. consumption as a % of world production	18%
U.S. net import reliance as % of consumption	23%

Import sources:
Brazil 27%, Canada 16%, Norway 13%, Venezuela 13%

Price (Cents per pound silicon):

Yr	1989	1988	1987	1986	1985
Ferro (50%)	51.4	50.6	41.3	40.0	44.6
Metal	68.5	68.2	62.0	62.0	63.3

Primary uses by industry:
The main consumers of silicon metal are U.S. aluminum producers and the chemical industry. By end use: transportation 28%, chemicals 21%, machinery 17%, construction 15%

Issues:
Ferrosilicon was produced by seven companies and silicon metal was also produced by seven companies domestically with estimated 1989 value of $465 million. It is estimated that domestic consumption of ferrosilicon and silicon metal in 1990 will be 600,000 tons.

World and domestic silicon resources for making silicon metal and alloys are abundant and are adequate to supply world requirements for many decades.

Silver

U.S. domestic production, 1989	1,710 mt
Estimated U.S. production, 1990	+1,700 mt
U.S. production as a % of world production	12%
U.S. domestic reserves	31,000 mt
U.S. reserves as a % of world reserves	11%
U.S. domestic industrial consumption	Not available
U.S. consumption as a % of world production	Not available
U.S. net import reliance as % of consumption	Not available

Import sources:
Mexico 37%, Canada 32%, Peru 7%, United Kingdom 7%

Price (Dollars per troy ounce):

Yr	1989	1988	1987	1986	1985
$	5.55	6.54	7.01	5.47	6.14

Primary uses by industry:
Photography 60%, electronic 20%, sterlingware and jewelry 10%

Issues:

The United States is a net importer of silver; however, changes in unreported investor stocks preclude calculation of a meaningful net import reliance.

U.S. mine production of silver increased to its highest level since 1970 despite a drop in the average silver price. The increase is primarily due to the reopening of the large silver producing mines in the Coeur d'Alene area of Idaho, a new zinc-silver-lead mine in Alaska, and an increase in byproduct silver production. Silver was produced by about 160 domestic mines in 17 states in 1989 at an estimated value of $305 million. Ten mines accounted for about 55% of domestic production.

Approximately two thirds of world silver resources are associated with copper, lead, and zinc deposits. The remainder is in primary silver vein deposits. Significant future reserves are expected to be associated with major base metal discoveries that contain byproduct silver.

Stone (Dimension)

U.S. domestic production, 1989	1,251,000 tons
Estimated U.S. production, 1990	Not available
U.S. production as a % of world production	Not available
U.S. domestic reserves	Adequate
U.S. reserves as a % of world reserves	Not available
U.S. domestic consumption	654,000 tons
U.S. consumption as a % of world production	Not available
U.S. net import reliance as % of consumption	48%

Import sources:
  Dimension stone: Italy 66%, Spain 8%, Canada 6%
  Granite: Italy 66%, Canada 14%, Spain 8%

Price: Variable depending on type of product

Primary uses by industry:
  Construction of buildings 45%, monuments 23%, rubble 12%

Issues:

Dimension stone was produced by 200 companies at 300 quarries in 35 states. Of the total, 52% was granite, 28% was limestone, 10% was sandstone, 3% was slate, and 2% was marble. Dimension stone imports increased significantly for the ninth successive year and the value of imports exceeded that of production for the seventh successive year.

World stone resources are inexhaustible. Resources can be limited on a local or regional level by the lack of stone suitable for particular applications.

Titanium

U.S. domestic production, 1989; metal	24,000 mt
dioxide	1,007,000 mt
Expected U.S. production, 1990; metal	25,000 mt
dioxide	1,040,000 mt
U.S. production as a % of world production, metal	25.5%
U.S. domestic reserves	Not available
U.S. reserves as a % of world reserves	Not available
U.S. domestic consumption; metal	25,000 mt
dioxide	984,000 mt
U.S. consumption as a % of world production, metal	24.5%
U.S. net import reliance as % of consumption; metal	6%
dioxide	Net exporter

Import sources:

Sponge metal: Japan 91%, China 8%

Titanium dioxide pigment: Fed. Rep. of Germany 22%, France 16%, Canada 13%, United Kingdom 13%

Price (Dollars per pound, year end):

Yr	1989	1988	1987	1986	1985
Rutile	1.02	0.96	0.81	0.81	0.78
Sponge metal	5.00	4.50	4.10	4.00	3.75

Primary uses by industry:

Sponge metal: Jet engines, airframes and space applications 80%, chemical processing, power generation, marine and ordnance, medical 20%

Titanium Dioxide: Paint, varnish and lacquer 48%, paper 24%, plastics 17%

Issues:

In 1989, titanium sponge metal was produced by three U.S. companies; and the value of sponge metal consumed was about $265 million. Titanium dioxide valued at $1.8 billion was produced by five U.S. companies in 1989.

Titanium dioxide plants continued to run at near capacity due to record high United States and world demand. The domestic sponge metal production rate increased in 1989 and was about 85% capacity. Titanium demand increased mainly due to increased orders for commercial aircraft. Consumption for 1990 is expected to be 25,000 tons metal and 1.04 million tons dioxide.

Tungsten

U.S. domestic production, 1989	Withheld
Estimated U.S. production, 1990	Withheld
U.S. production as a % of world production	Withheld
U.S. domestic reserves	150,000 mt
U.S. reserves as a % of world reserves	6%
U.S. domestic consumption	10,085 mt
U.S. consumption as a % of world production	24%
U.S. net import reliance as % of consumption	73%

Import sources:
China 40%, Bolivia 9%, Fed. Rep. of Germany 7%

Price (Dollars per mtu WO_3 content):

Yr	1989	1988	1987	1986	1985
$	56	59	50	46	68

Primary uses by industry:
Metalworking, mining, construction machinery 68%, lamps and lighting 12%, electrical machinery 7%, transportation 6%

Issues:

About 90% of worldwide tungsten resources are located outside the United States and about 50% are in China. In 1987, the United States and China initiated a 4-year marketing agreement which limits the import of certain tungsten products to the United States. The agreement is designed to provide the domestic tungsten industry the import relief to maintain a viable domestic tungsten processing industry. The processing industry will continue to receive tungsten mine products from China and other foreign sources.

In 1989, production of tungsten concentrate occurred at two domestic mines. The existing trade agreements, together with anticipated consumption levels make it highly unlikely that domestic tungsten production will increase significantly in the near future. When production does resume, those companies with idle mine and mill facilities will be in a position to supply tungsten at the lowest prices. Milling facilities at the Ima mine have been dismantled; the development of tungsten resources there or in the Thompson Creek or Peach Creek areas is unlikely for the foreseeable future.

Uranium, U_3O_8

U.S. domestic production, 1989	13,700,000 lb
Estimated U.S. production, 1990	10,400,000 lb
U.S. production as a % of world production	12%
U.S. domestic reserves	Unknown
U.S. reserves as a % of world reserves	Unknown
U.S. domestic consumption	40,900,000 lb
U.S. consumption as a % of world production	46%
U.S. net import reliance as % of consumption	Not available

Import sources:
Canada, South Africa, Australia

Price (Dollars per pound U_3O_8 content, estimated):

Yr	1989	1988	1987	1986	1985
$	10.38	14.15	12.50	17.00	15.75

Primary uses by industry:
Energy producers, military

Issues:

The passage of the Free Trade Agreement between the United States and Canada, the world's leading uranium producer, coupled with the U.S Supreme Court decision which allows U.S. energy companies to buy and process foreign uranium, is expected to continue downward pressure on future uranium prices in the current climate of excess world supply.

The western United States has vast reserves of sediment-hosted uranium. High-volume, low-unit-cost mining and milling facilities are in place at many of these locations, but new taxes, trade agreements, and reclamation costs have forced most of these operations to shut down. Supplies from foreign sources and remaining domestic reserves make it highly unlikely that the vein-type or small sediment-hosted uranium deposits in the Stanley area will be developed in the foreseeable future.

The uranium industry in the United States is currently nearly inactive, and may remain in this condition in the future. A major change in the demand for uranium would be required for small mines to become competitive (Worl and others, 1989).

Vanadium

U.S. domestic production, 1989	Withheld
Estimated U.S. production, 1990	Withheld
U.S. production as a % of world production	Not available
U.S. domestic reserves	300,000,000 lb
U.S. reserves as a % of world reserves	3%
U.S. domestic consumption	10,250,000 lb
U.S. consumption as a % of world production	15%
U.S. net import reliance as % of consumption	Withheld

Import sources:
Republic of South Africa 37%, South America 23%, European communities 8%, Austria 5%

Price (Dollars per pound V_2O_5):

Yr	1989	1988	1987	1986	1985
$	4.50	6.50	3.50	3.50	3.50

Primary uses by industry:
Machinery and tools 30%, transportation 23%, construction 23%

Issues:
The domestic vanadium industry demonstrated strong growth in the first half of 1989, reversing the economic slump that it had been in from 1983 through 1987. Vanadium products began to show signs of a modest recovery in 1988. By the first quarter of 1989, plants were operating at or near capacity. Shipments and reported consumption reached their highest levels since 1984. Prices softened as new production began to reach the market in the fourth quarter.

Zeolites

U.S. domestic production, 1989	14,500 tons
Estimated U.S. production, 1990	7,000-14,000 tons
U.S. production as a % of world production	Unknown
U.S. domestic reserves	Extensive
U.S. reserves as a % of world reserves	Unknown
U.S. domestic consumption	14,800 tons
U.S. consumption as a % of world production	Unknown
U.S. net import reliance as % of consumption	0%

Import sources:
Not available

Price (Dollars per ton):

Yr	1989	1988	1987	1986	1985
$	100-450; Price ranges according to the purity of the product				

Primary uses by industry:

Zeolites are used for a wide variety of applications, including molecular sieves for gasses and liquids, in petroleum distillation (cracking), food supplements for livestock, soil additives and conditioners, fillers in fertilizers and insecticides, water purification and cesium stabilization in pollution control, and as a desiccant.

Issues:

Zeolites were produced by about seven U.S. companies in 1989. Domestic resources are adequate to supply domestic demand for the foreseeable future.

There are no industry standards detailing the specific physical requirements that constitute "ore grade material" for zeolite-bearing rocks. Generally, the zeolite-bearing material (commonly tuffs) should contain more than 70% zeolites and most of the total zeolite content should be composed of a single zeolite material. The two most common zeolite minerals in domestically produced zeolite ore are chabazite and clinoptilolite. Commonly, zeolite-bearing rock is discovered and then an industrial application is developed according to the cation exchange capacity, pore size, and other characteristics of the material.

Zinc

U.S. domestic production, 1989	325,000 mt
Estimated U.S. production, 1990	Above 1989 level
U.S. production as a % of world production	5%
U.S. domestic reserves	20,000,000 mt
U.S. reserves as a % of world reserves	14%
U.S. domestic consumption	1,090,000 mt
U.S. consumption as a % of world production	15%
U.S. net import reliance as % of consumption	61%

Import sources:
Canada 55%, Mexico 8%, Peru 6%, Spain 6%, Australia 5%

Price (Cents per pound):

Yr	1989	1988	1987	1986	1985
	83.0	60.2	41.9	38.0	40.4

Primary uses by industry:
Construction 45%, transportation 22%, machinery 12%, electrical 11%

Issues:

World zinc production and consumption were at record high levels in 1989. Tight supply resulted in record high prices and supply-demand estimates for 1990 suggest a similar situation. Domestic zinc production was near capacity in 1989.

The estimated value of domestic zinc production in 1989 was $447 million. The 25 leading mines accounted for 99% of this value and the top 5 producers yielded about 40% of production. Sphalerite-bearing coals in the midcontinent states have resource potential of many million tons of zinc that could possibly be recovered as a byproduct of coal beneficiation processes.

Wastewater and blowdown from acid plants at primary zinc smelters have retained exclusion from expensive EPA requirements but the sludge generated at these plants has been classified as hazardous waste by the EPA since August 1988.

Zirconium

U.S. domestic production, 1989	120,000 mt zircon concentrate
Estimated U.S. production, 1990	Unknown
U.S. production as a % of world production	12%
U.S. domestic reserves	3,100,000 mt
U.S. reserves as a % of world reserves	9%
U.S. domestic consumption	88,070
U.S. consumption as a % of world production	14%
U.S. net import reliance as % of consumption	13%

Import sources:

Zirconium ore, Australia 65%, Republic of South Africa 29%,
Zirconium metal, France 76%, U.K. 7%, Canada 7%
Zirconium oxide, Republic of South Africa 56%, U.K. 32%

Price (Dollars per metric ton zircon):

Yr	1989	1988	1987	1986	1985
$	468	419	223	209	193

Primary uses by industry:

About 95% of all zirconium was used in the form of its minerals zircon and baddeleyite, the rest was used in the metallic form. Zircon was used primarily in foundry sands, refractories, ceramics, and abrasives. Baddeleyite was used in abrasives and ceramics. The metal was used in nuclear power reactors and in superalloys.

Issues:

In 1989, three domestic companies produced principal zircon. It was mined in Florida by two companies from placer deposits of heavy mineral sands as a coproduct of three titanium minerals.

World demand for zircon continued to increase more rapidly than sources of heavy mineral sands could be brought into production. As demand and prices increased, exploration for heavy mineral sands reportedly increased, especially in the Southeastern United States. Domestic resources of zircon are about 4.8 million mt associated with titanium sands. World resources are about 55 million mt. Zircon is typically 65% ZrO_2.

The enclosed diskette contains identifier, location, status, reference, and commodity information for each of the 723 properties within the Challis National Forest identified by the USBM. The information is in dBase III+ format (also retrievable into dBase IV), which provides a means of searching, rearranging, and updating the data. To access the data "use" CHALLIS.DBF. The database structure is briefly explained below.

Identifier:

NAM	Name of the property
OWN_OPER	Owner and operator of the property, if known
MSEQ	USBM MILS (Minerals Industry Location System) sequence (identification) number

Location:

LAD,LAM,LAS	Latitude; degrees, minutes, seconds
LOD,LOM,LOS	Longitude; degrees, minutes, seconds
TWN	Township, all are north, leading zeroes facilitate sorting, trailing zeroes are for half-townships
RNG	Range, all are east, leading zeroes facilitate sorting, trailing zeroes are for half-ranges
SEC	Section
QUA	Topographic map (1°x2°) code, 234=Hailey, 235=Challis, 244=Dubois, 245=Idaho Falls
MNE	Map name, quadrangle used for plotting location given
MSC	Map scale, above quadrangle

Character:

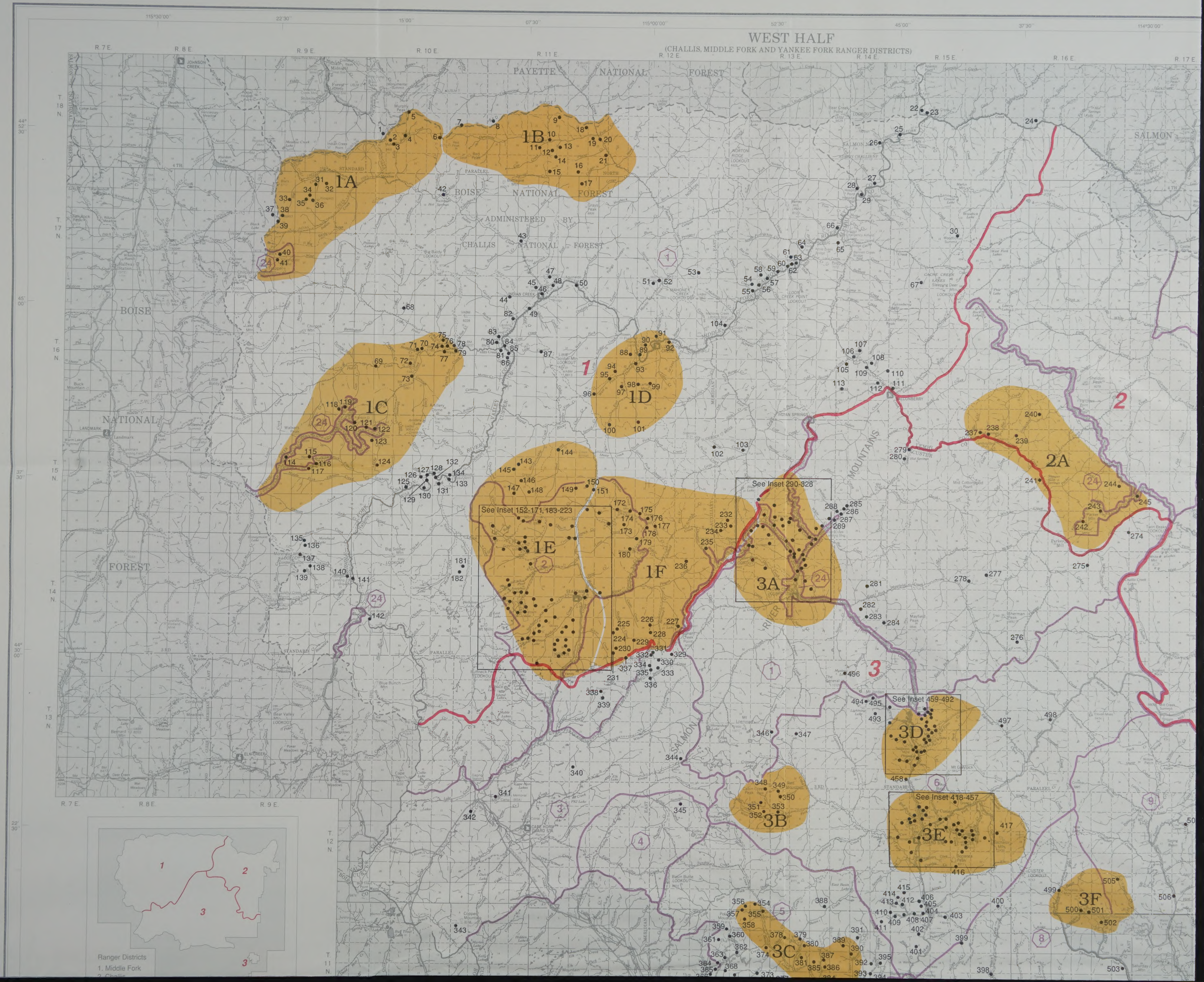
ST	Status, blank or U=unknown, P=producing mine, PP=past producer, D=developed deposit, E=explored deposit, R=raw prospect
RD	Ranger District, 1=Middle Fork, 2=Challis, 3=Yankee Fork, 4=Lost River
MU	Management areas, from the Land Resource Management Plan for the Challis National Forest (1987)
CC	Apparently covered by current mining claims, yes or no
P	Patented mining claim, yes or no
YOLA	Year of Last Activity, mainly from USFS files
REFR	References, keyed to USBM MLA OFR 6-91
COMMENTS	Comments
MAP	Map number, keyed to USBM MLA OFR 5-91 and 6-91
COM	Commodities, element symbols or other abbreviation

The intention of providing this database is to aid the user in locating available information on known mining sites within the forest. The database also provides a method for users to update and refine information on known sites and to document newly identified locations. Data management programs other than dBase may be used to work with these files; consult program manuals or other technical support for procedures.

floppy disk

WEST HALF

(CHALLIS, MIDDLE FORK AND YANKEE FORK RANGER DISTRICTS)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1B
1C
1D
1E
1F
2A
3A
3B
3C
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3E
3F
1
2
3
PAYETTE NATIONAL FOREST
BOISE NATIONAL FOREST
ADMINISTERED BY
CHALLIS NATIONAL FOREST
BOISE NATIONAL FOREST
SALMON
MOUNTAINS
RIVER
SALMON
See Inset 152-171, 183-223
See Inset 290-328
See Inset 459-492
See Inset 418-457
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R. 8 E.
R. 9 E.
R. 10 E.
R. 11 E.
R. 12 E.
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45'00"
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114°30'00"
44° 52' 30"
45' 00"
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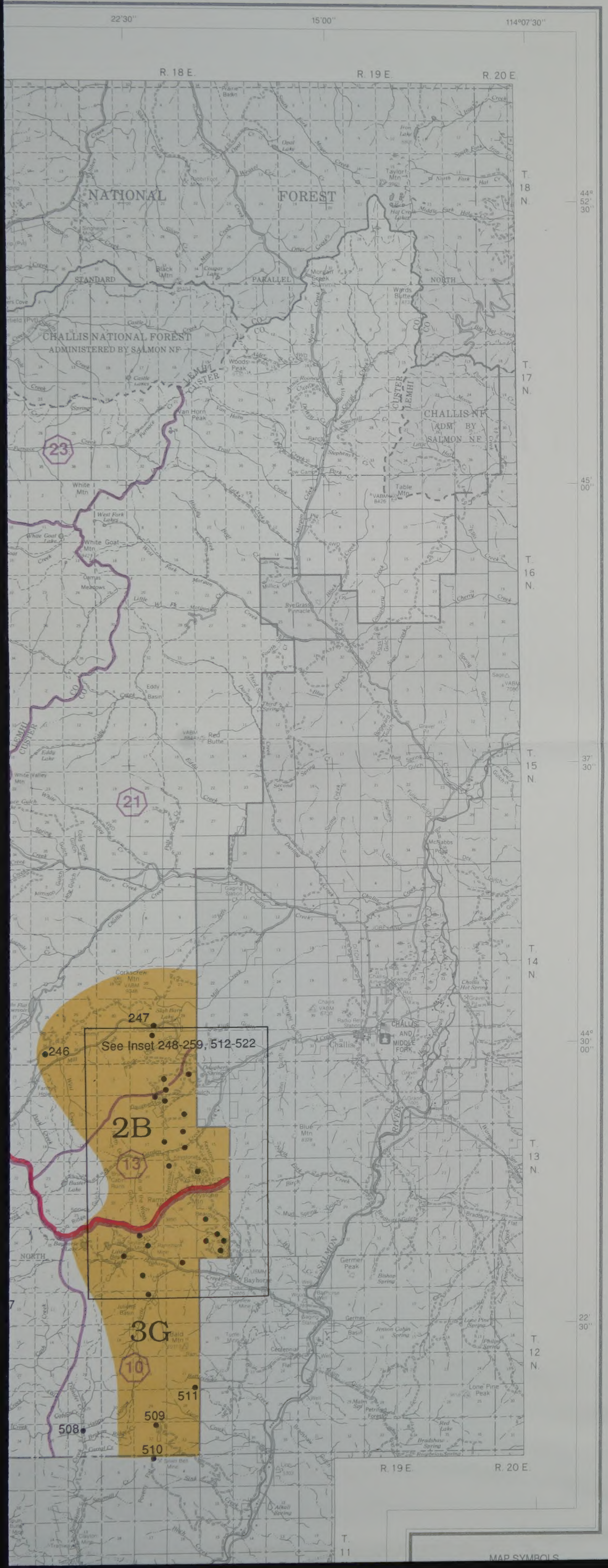
44° 30' 00"
22' 30"
Ranger Districts
1. Middle Fork
2. Challis

OPEN FILE REPORT
PLATE 1



LEGEND

1

Ranger District Boundary

24

U.S. Forest Service Management Areas[1]

No.	Name
1	Frank Church-River of No Return Wilderness
2	Seafoam
3	Marsh Creek
4	Valley Creek
5	Basin Creek
6	Yankee Fork
7	East Fork
8	Thompson Creek
9	Squaw Creek
10	Bayhorse
11	Pioneer Mountains
12	Arco Hills
13	Garden Creek
14	South Lemhi
15	South Lost River
16	Borah Peak
17	Pahsimeroi Mountains
18	Mackay Front
19	North Pahsimeroi
20	North Lemhi
21	Challis Creek
22	Sawmill Canyon
23	Furnace Creek
24	Wilderness Corridors
25	Antelope Creek

[1] From Land Resource Management Plan for the Challis National Forest,1987

3A

Areas of Development Interest

1A Indian Creek area
Polymetallic skarns
(tungsten)

Base metal veins
(copper, lead, zinc)

Precious metal veins
(gold, silver)

Fluorspar veins
(fluorspar)

Stockwork molybdenum deposits
(molybdenum)

Tungsten stockwork and vein deposits
(tungsten)

1B Marble Creek area
Precious metal disseminated deposits
(gold, silver)

Precious metal veins
(gold, silver)

1C Pistol Creek area
Polymetallic metal veins
(gold, lead, zinc)

Polymetallic skarns
(tungsten)

Stockwork molybdenum deposits
(molybdenum)

1D Middle Fork area
Base metal veins
(silver, lead, zinc)

Polymetallic skarns
(tungsten)

Stockwork molybdenum deposits
(molybdenum)

1E Seafoam mining district
Base metal veins
(lead, zinc, silver)

Polymetallic veins
(silver, lead, zinc)

Stockwork molybdenum deposits
(molybdenum)

1F Sheep Mountain mining district
Base metal veins
(copper, lead, zinc)

Polymetallic veins
(silver, lead, zinc)

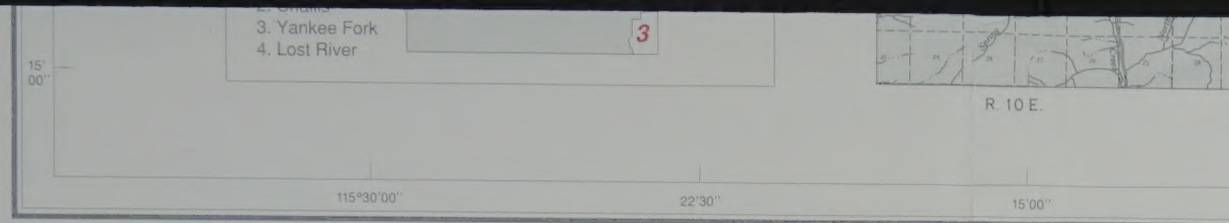
Stockwork molybdenum deposits
(molybdenum)

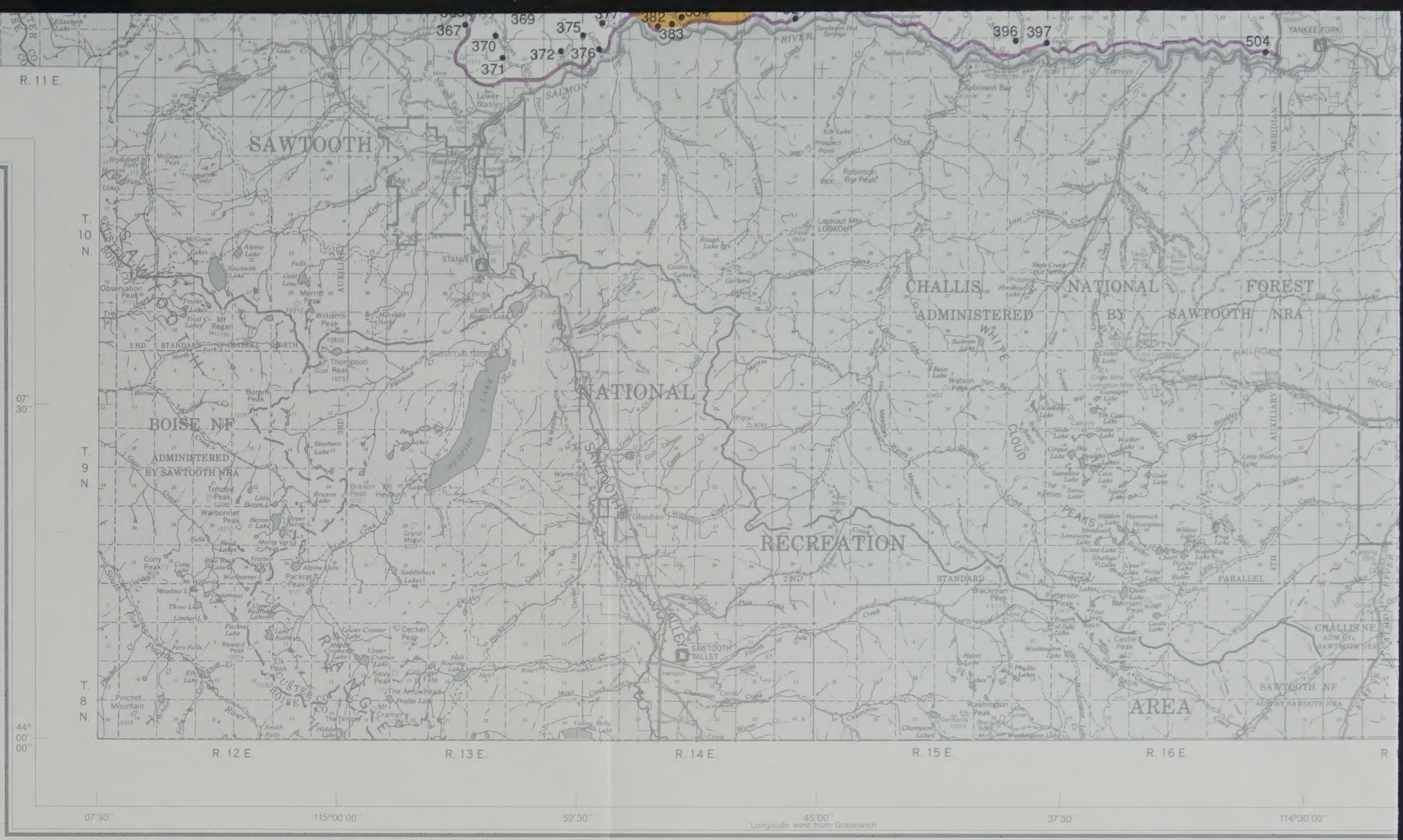
2A Parker Mountain area
Veins in volcanic rocks
(gold, silver, fluorspar)

2B Garden Creek area
Fluorspar veins and mantos in dolomite
(fluorspar)

41	Springfield Scheelite mine	W U
42	Kwiskwis Hot Spring	Geothermal
43	Middle Fork Indian Cr Hot Springs	Geothermal
44	Wild Dream prospect	Gemstone
45	Gold Flat prospect	Cu Ag Au
46	Indian Creek Landing Field placer	Au Black sand
47	Come Back prospect	Au Zn Cu Pb Ag
48	Indian Creek Quartz deposit	SiO2
49	Huntington placer	Au Black sand
50	Pungo Creek Fluorspar prospect	Fluorspar
51	Spring Creek prospect	Pb Au Ag
52	Mitchell Ranch placer	Au Black sand
53	Marble Creek Fluorspar occurrence	Fluorspar
54	Pine Creek placer	Au Black sand
55	Crystal uranium prospect	U
56	Upper-Lower Red Bluff Creek placers	Au Black sand
57	Lower Bacon Creek placer	Au Black sand
58	Bacon Creek placer	Au Black sand
59	Culver Creek placer	Black sand Au
60	Rock Island placer	Au Black sand
61	Cox Hot Spring	Geothermal
62	Cox Hot Spring Bar placer	Au Black sand
63	Shep Creek Bar placer	Black sand Au
64	White Creek Bar placer	Black sand Au
65	Geothermal location	Geothermal
66	Simplot Ranch placer	Au Black sand
67	Prospect	Cu Pb
68	Virginia Beth prospect	Ag Au Cu Mo
69	Primitive group placer	Au Black sand
70	Iowa-Virginia placer	Au Black sand
71	Green Rock prospect	No metals detected
72	Indiana placer	Black sand Au
73	RDG prospect	Cu Mo Ag Au
74	Molly mine group	Ag Au
75	Cross Forks placer	Black sand Au
76	Geothermal location	Geothermal
77	Speckled Trout placer	Black sand Au
78	Twenty-five Creek placer	Au Black sand
79	Thirty-two Creek placer	Au Black sand
80	Buckhorn placer	Au Black sand
81	Horse Pistol placer	Au Black sand
82	Mule Creek placer	Au Black sand
83	Indian Joe placer	Au Black sand
84	Lake Creek placer	Au Black sand
85	Lower's placer	Au
86	Cap Creek prospect	Pb Cu
87	Teapot prospect	Ag Au Black sand Cu
88	Middle Fork Lodge placer	Black sand Au
89	Thomas Creek placer	Au
90	Little Creek placer	Black sand Au
91	Sunflower Flat placer	Black sand Au
92	Jackass Flat placer	Black sand Au
93	Lower Thomas Creek placer	Au Black sand
94	Robinhood prospect	Zn Pb Cu Au Ag
95	Lovell-Jones prospect	Au Ag
96	Iowa Boy prospect	Au Ag Cu
97	Hogback Quartz prospect	Cu
98	Little Johnny prospect	Ag Pb
99	Chickadee Quartz prospect	Au Pb
100	Thomas Creek No. 2 prospect	Ag Au
101	Thomas Creek No. 3 prospect	Au Ag
102	Dirty Dutchman prospect	Au Cu Pb Ag
103	Triple B prospect	Ag Au
104	Cougar Ranch placer	Au Black sand
105	Biggs Ranch placer	Au Black sand
106	Good Enough group	Au Ag
107	White Quartz	No metals detected
108	Burn Creek prospect	Ag Cu Au
109	Black Nugget prospect	Cu Au Ag
110	Can't Savie prospect	No metals detected
111	Valentine group	Ag Cu
112	Falconberry Ranch placer	Au Black sand
113	Jack Creek prospect	Au Ag
114	Prospect	Ag Au
115	Prospect	No metals detected
116	Mine	Ag Au
117	Silver Sue (Bacon and Beans, etc)	Ag Au
118	KW prospect	Ag Au Pb
119	Cougar mine	Ag Au Pb
120	Franklin D. mine	Ag Pb Au
121	Coleman prospect	Au Pb Cu Ag
122	Lucky Ladd mine	Pb Au Ag Cu
123	Prospect	Ag
124	Golden King prospect	Au Ag
125	Geothermal location	Geothermal
126	Prospect	Ag Au
127	Powerhouse Bar placer	Au
128	Prospect	Pb Zn Ag Au
129	Prospect	Ag Au
130	Deer Horn Creek Bar placer	Au
131	Snowslide prospect	Au Ag
132	Joe Bump Bar placer	Au
133	Sheepeater Bar placer	Au
134	Sheepeater Hot Spring	Geothermal
135	Prospect	Ag
136	Prospect	Ag Cu
137	Prospect	No metals detected
138	Robin prospect	Pb Au Ag
139	KG prospect	Au Ag Cu Pb
140	Geothermal location	Geothermal
141	Prospect	Cu Ag
142	Geothermal location	Geothermal
143	Hardscrabble group	Pb Cu Ag Zn Au
144	Bell Creek placers	Au
145	Outlook prospect	No metals detected
146	Ramshorn prospect	Ag Au Cu
147	West Side prospect	Ag Au
148	Columbus prospect	No metals detected
149	Snowstorm group	Au Ag
150	Blackjack mine	Au Mo Zn Pb Ag
151	Idaho prospect	Ag Au Pb
152	Republican group	Cu Ag Au Pb
153	Capitol State	Ag Au
154	Porphyry Peak prospect	No metals detected
155	Dowling Quartz prospect	Zn Ag Pb
156	Brown Bear prospect	Au Ag
157	Moonshine prospect	Pb
158	Prospect	No metals detected

284	Blue Lady prospect	Cu Au Ag
285	Shell Creek Bar placer	Au
286	Double Bar placer	Au
287	East Transfer Bar placer	Au
288	West Transfer Bar placer	Au
289	Tincup Bar placer	Au
290	West Tincup Bar placer	Au
291	Airport disseminated copper	Cu
292	Airport Bar placer	Au
293	Loon Creek placers	Au
294	Prospect	Au
295	Prospect	Au
296	Prospect	Au
297	Prospect	Au
298	New York mine	Au Ag Cu
299	Prospect	Au Cu
300	Prospect	Au Ag
301	Prospect	Au
302	Prospect	Ag
303	Prospect	Ag
304	Effa mine	Au Cu Ag
305	Lost Packer mine	Au Ag Cu
306	Prospect	Au
307	Prospect	Au
308	Prospect	Fe
309	Prospect	Fe
310	Prospect	Ag
311	Prospect	Fe
312	Prospect	Au
313	Sunrise (Metcalf) claim	Ag Pb
314	Sunrise group and Lost Eagle shaft	Ag Pb Au
315	Blue Bird prospect	Fe
316	Prospect	Au
317	Prospect	Au
318	Lucky Day	Ag Au
319	Prospect	Au
320	Prospect	Au
321	Prospect	Cu Au
322	Prospect	Au
323	Prospect	Ag
324	Prospect	Au
325	Prospect	Au Cu
326	Loon Creek quartz vein	Zn Pb Cu
327	Prospect	Au Ag
328	Monte Cristo mine	Au Ag Cu Pb
329	Prospect	Zn Pb Ag
330	Prospect	Ag Zn Pb
331	Francisco	Pb Zn Ag
332	Prospect	Ag Zn Pb
333	Prospect	Zn Pb Ag
334	P-W 83 and 84	Ag Zn Pb
335	Prospect	Zn Pb Ag
336	Do-J No. 1	Fe S Ag Au
337	Phonta-Williamson	Pb Zn Ag Co Ni
338	Winn B prospect	No metals detected
339	Prospect	No metals detected
340	Horn 1-163	U
341	Geothermal location	Geothermal
342	Boo Berry Hill	Au
343	Passover 1-36	Cu
344	Panic 1-108	U
345	Dominion	U
346	Misty Mountain (Lazy Susan) group	Mo Au Ag
347	A R M P group	Mo
348	Hindman	Au Ag
349	Park Creek Silver	Ag
350	Crystal claim	Au Ag
351	Red Mountain	Au Ag
352	Independence	Au Ag
353	West Fork of Yankee Fork	Au
354	Aspen #4	U
355	Little Bill mine	U Sb
356	Baker	U
357	Golden Day (Golden Ray) mine	Zn Cu Au Ag Pb
358	Enterprise	U
359	Genesis (H & M)	U
360	Main Diggings	U
361	Bell Cross	Hg U
362	Chinese placer	Au
363	Weidman placer (Faith # 4)	Au Th U REE Ti Garnet Zircon
364	Sturkey placer	Au
365	Wonder 19 Extended	Au REE Black sand Ag
366	Second Chance (Silver Dollar)	Sb
367	Willow group (Willis group)	Au REE Black sand
368	Kelly & Joe	Au REE Ag
369	Upper Noho Creek	Au
370	Iron Crown	Au Ag
371	Joes Gulch placer	Au REE Th Ag
372	Elkhorn	U
373	Horseshoe (Bright Star 6,10,15)	U
374	Kelly Creek placer	U
375	Copper Creek occurrence	W
376	Bright Star	Fluorspar Au Ag Te
377	Hide Out	Fluorspar
378	Shorty mine	U
379	East Basin mine	U
380	Uranus prospects	U
381	Lucky Strike	U
382	Rocket 1-5 & Saturn (P & B)	U
383	Abbie Lou	U
384	Fool Proof	U
385	Coal Creek mine	Stone U
386	Deer Strike mine	U
387	Little Joe	U
388	W A J 151-154	U
389	Hardee	U Au Ag Sb
390	Alta	U Au Ag Sb
391	Shamrock	U
392	Lower Harden	U
393	Mandate	Au Ag U
394	American Creek placer	Au Pb Ag
395	Big Hank	U
396	Peach Creek prospects	Cu Pb Zn
397	Elkhorn placer	Au
398	Molly Hogan 1-22 group	W Mo
399	Annabel Lee group	Cu
400	Billy John 1-2	W
401	Little Leslie 1-4 (Hygrade)	Pb Mo Au Ag


3. Yankee Fork
4. Lost River
3
15' 00"
115°30'00"
22'30"
15'00"

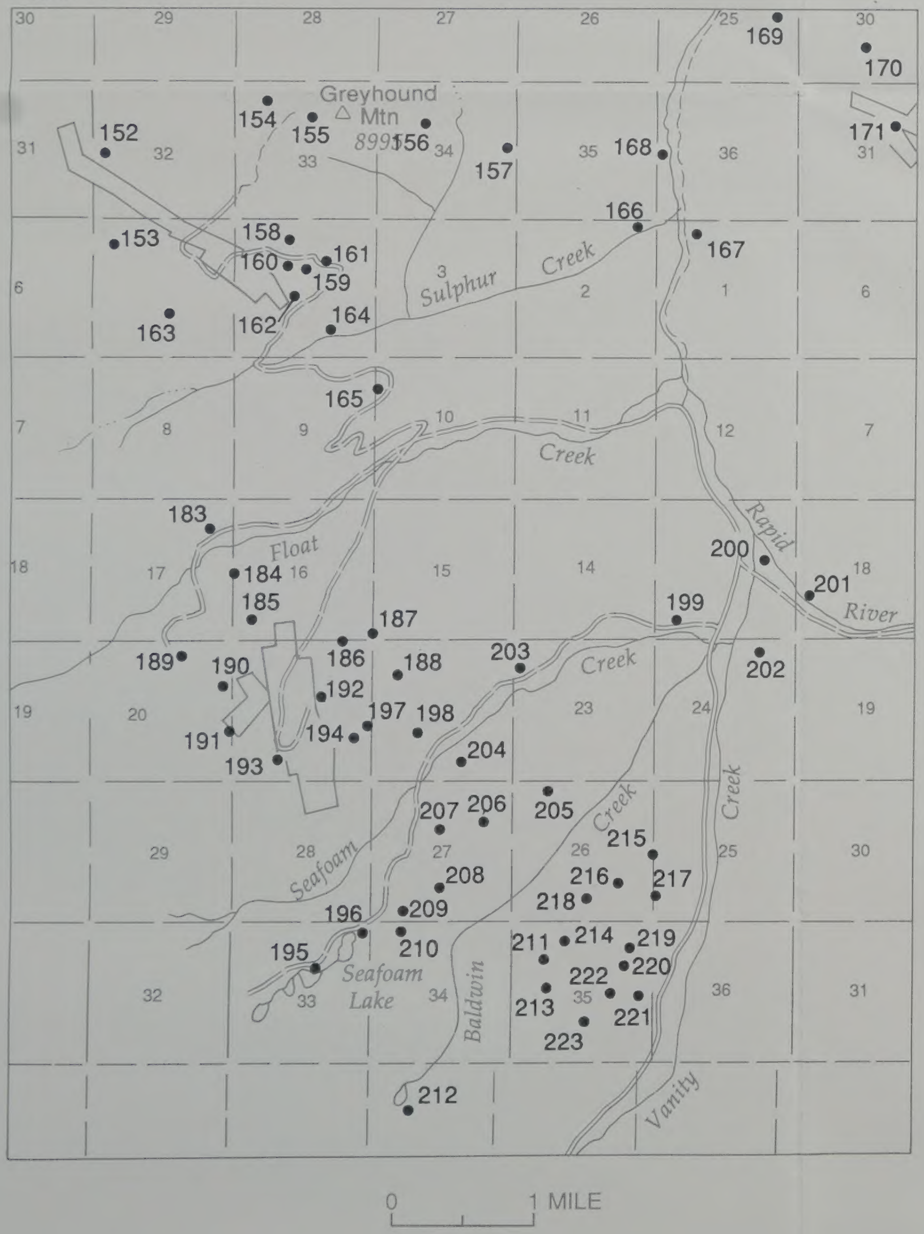

367
369
370
371
372
375
376
383
396
397
504
R. 10 E.
R. 11 E.
SAWTOOTH
T. 10 N.
T. 9 N.
T. 8 N.
BOISE NF
ADMINISTERED BY SAWTOOTH NRA
NATIONAL
CHALLIS NATIONAL FOREST
ADMINISTERED BY SAWTOOTH NRA
RECREATION
AREA
R. 12 E.
R. 13 E.
R. 14 E.
R. 15 E.
R. 16 E.
07'30"
115°00'00"
52'30"
45'00"
37'30"
114°30'00"
Longitude west from Greenwich

MINES, PROSPECTS, AND AREAS OF DEVELOPMENT INTEREST IN THE CHALLIS NATIONAL FOREST, IDAHO, WEST HALF

MAP PRODUCED AND PUBLISHED BY
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Scale 1:126,720
1 ½ 0 1 2 3 4 5 Miles
1 ½ 0 1 2 3 4 5 Kilometers

Inset 152-171, 183-223


Greyhound Mtn
8995
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
183
184
185
186
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204
205
206
207
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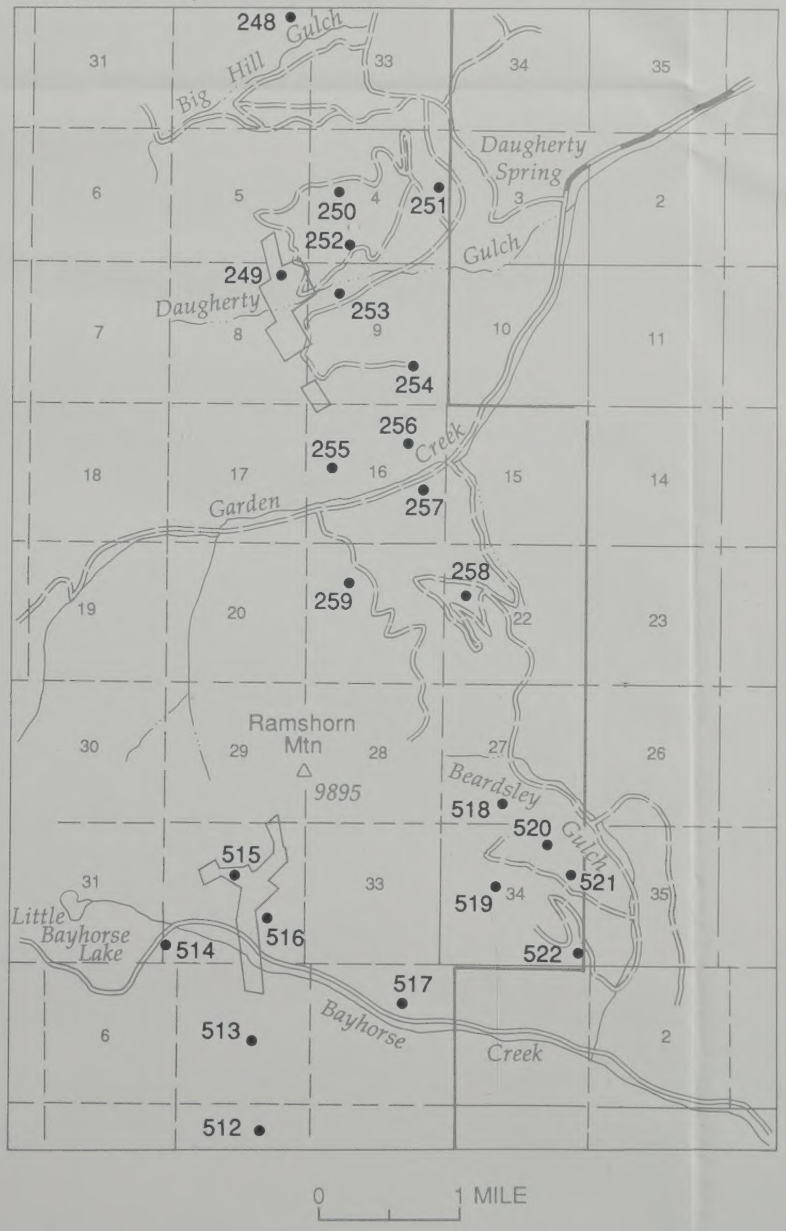
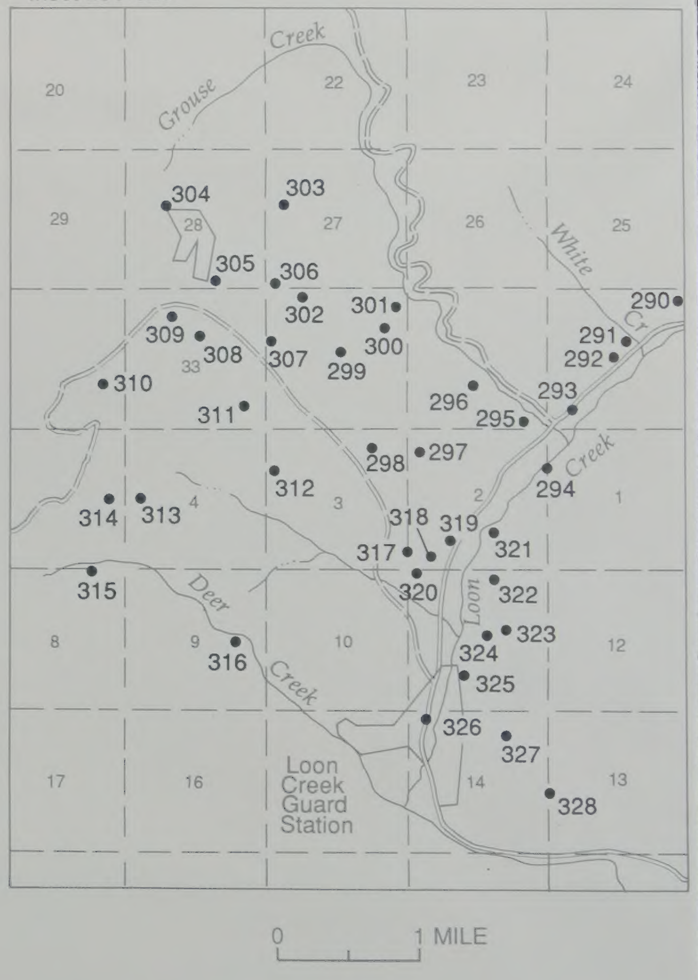
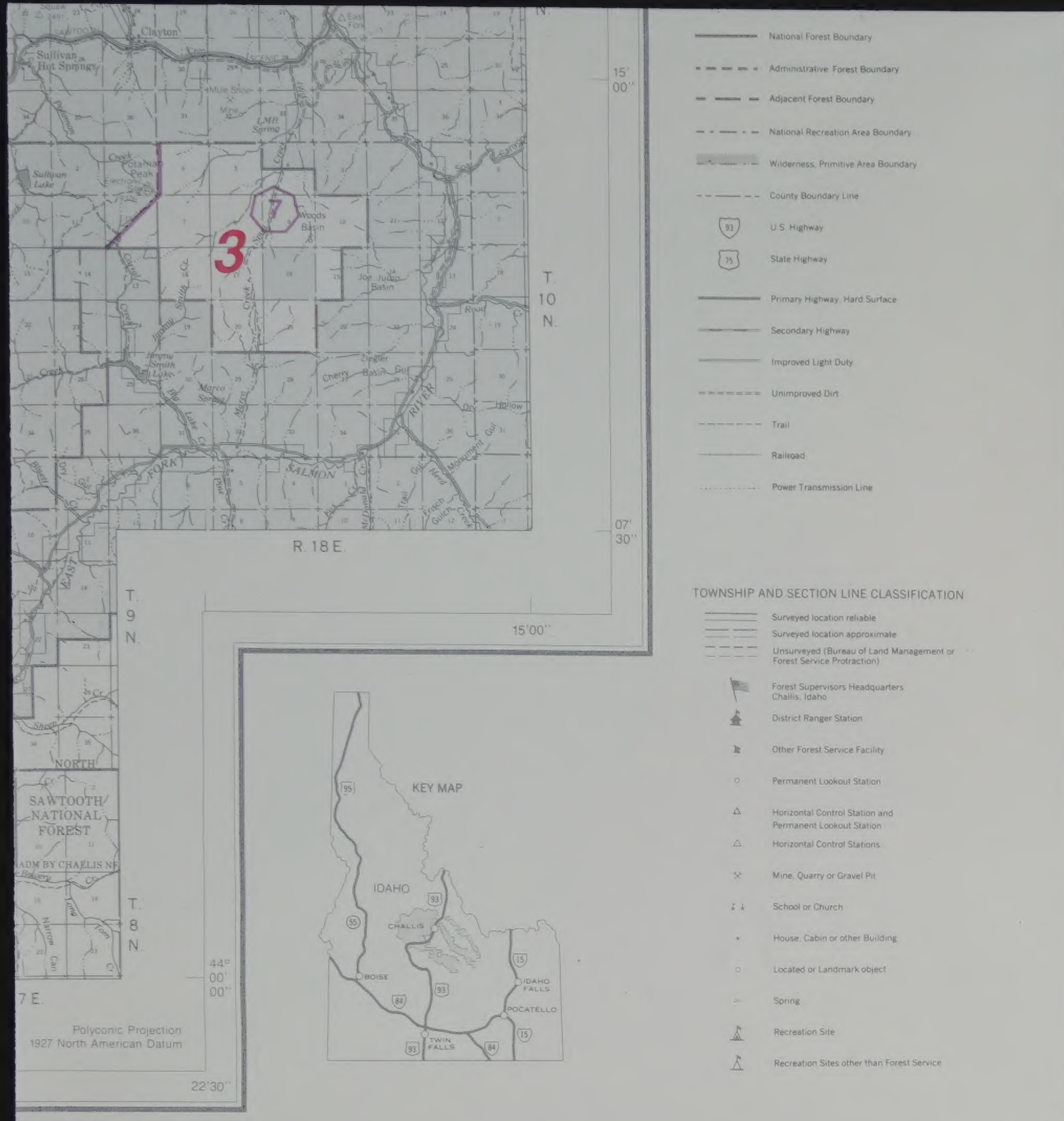
211
212
213
214
215
216
217
218
219
220
221
222
223
Sulphur Creek
Creek
Float
Rapid River
Creek
Seafoam
Seafoam Lake
Baldwin
Creek
Creek
Vanity
0
1 MILE

Inset 248-259, 512-522

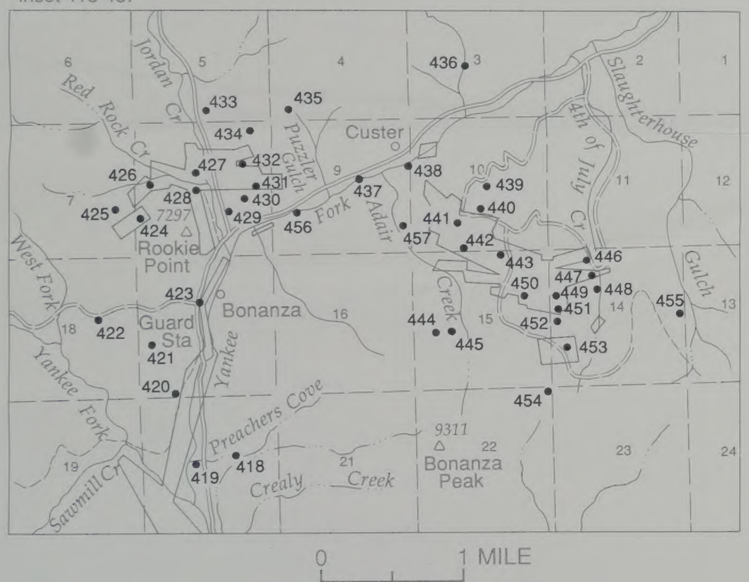

248
Big Hill Gulch
Daugherty Spring
Gulch
250
251
252
249
Daugherty
253
254
255
256
257
Garden Creek
258
259
Ramshorn Mtn
9895
Beardsley Gulch
518
520
521
519
522
515
516
514
Little Bayhorse Lake
517
513
Bayhorse Creek
512
0
1 MILE

Inset 290-328


Grouse Creek
White Cr.
Creek
Deer Creek
Loon
Loon Creek Guard Station
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
0
1 MILE


3
7
T 10 N
T 9 N
T 8 N
R 18 E
15' 00"
07' 30"
15'00"
44° 00' 00"
22'30"
SAWTOOTH NATIONAL FOREST
Polyconic Projection
1927 North American Datum
National Forest Boundary
Administrative Forest Boundary
Adjacent Forest Boundary
National Recreation Area Boundary
Wilderness, Primitive Area Boundary
County Boundary Line
U.S. Highway
State Highway
Primary Highway, Hard Surface
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Railroad
Power Transmission Line
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed location reliable
Surveyed location approximate
Unsurveyed (Bureau of Land Management or Forest Service Protraction)
Forest Supervisors Headquarters Challis, Idaho
District Ranger Station
Other Forest Service Facility
Permanent Lookout Station
Horizontal Control Station and Permanent Lookout Station
Horizontal Control Stations
Mine, Quarry or Gravel Pit
School or Church
House, Cabin or other Building
Located or Landmark object
Spring
Recreation Site
Recreation Sites other than Forest Service
KEY MAP
IDAHO
CHALLIS

Inset 418-457


Custer
Bonanza
Rookie Point
Guard Sta
Bonanza Peak
9311
7297
Red Rock Cr
Jordan Cr
Yankee Fork
West Fork
Preachers Cove
Crealy Creek
Sawmill Cr
Slaughterhouse Gulch
433
435
434
436
432
427
426
431
428
430
425
424
429
456
437
438
439
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441
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442
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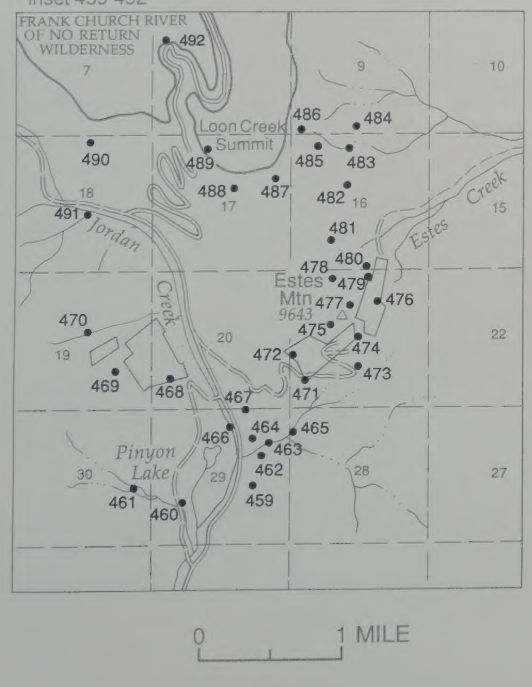
452
453
455
444
445
423
422
421
420
419
418
454
0 1 MILE

Inset 459-492


FRANK CHURCH RIVER OF NO RETURN WILDERNESS
Loon Creek Summit
Estes Mtn 9643
Jordan
Estes Creek
Pinyon Lake
492
490
491
489
488
487
486
485
484
483
482
481
480
479
478
477
476
475
474
473
472
471
470
469
468
467
466
465
464
463
462
461
460
459
0 1 MILE

Polymetallic veins and replacements in dolomite and black shale
(silver, copper, lead, zinc, gold)

3A Loon Creek mining district
Base metal veins
(copper, lead, zinc, gold, silver)

Polymetallic skarns
(copper, lead, zinc, silver, tungsten)

Polymetallic veins
(silver, lead, zinc)

Stockwork molybdenum deposits
(molybdenum)

Precious metal veins
(gold, silver)

3B Red Mountain area
High-level rhyolite-hosted precious metal deposits
(gold, silver)

Precious metal veins
(gold, silver)

Stockwork molybdenum deposits
(molybdenum, silver, gold)

3C Stanley Uranium area
Vein uranium deposits
(uranium, gold, silver, copper, antimony)

3D Sunbeam-Estes Mountain area
High-level rhyolite-hosted precious metal deposits
(gold, silver)

Precious metal deposits in volcanic tuff
(gold, silver)

Precious metal veins
(gold, silver)

3E General Custer-Lucky Boy area
High-level rhyolite-hosted precious metal deposits
(gold, silver)

Precious metal veins
(gold, silver)

3F Thompson Creek area
Stockwork molybdenum deposits
(molybdenum, copper, silver, gold)

Polymetallic skarn deposits
(tungsten, molybdenum)

3G Bayhorse mining district
Polymetallic veins in black shale and carbonate rocks
(silver, copper, lead, zinc, gold)

Irregular replacements of precious metals
(gold, silver)

Fluorspar veins and mantos
(fluorspar)

•240

Mines and Prospects

Middle Fork Ranger District

No.	Name	Commodity
1	Mule Train prospect	Pb Cu Ag Au W
2	Vesper prospect	Mo Ag Cu Au
3	Jerico prospect	Mo Cu Au
4	Lucky Boy placer	Au Ag
5	Murphy Peak prospect	Au Ag
6	Giant Legge group	Au Ag
7	Gem group	No metals detected
8	Brooklin prospect	No metals detected
9	Hercules group	Au Ag
10	Dynamite placer	Au Black sand
11	Hope prospect	Au Ag Cu
12	Jerome group	Au Ag
13	McKnight group	No metals detected
14	Gold Cord group	Au Ag
15	Chief Executive group	Cu Au Ag
16	Allegheny group	No metals detected
17	Grays Peak Opal deposit	Gemstone
18	Daylight and Darkness placer	Au Black sand
19	Bonanza placer	Au Black sand
20	Mountain View placer	Black sand Au
21	Golden Rule placer	Au Black sand
22	Camas Creek placer	Au Black sand
23	Camas Creek Point placer	Au
24	Yellowjacket placer	Black sand Au
25	Geothermal location	Geothermal
26	Tappan Ranch placer	Au Black sand
27	Sullivan Uranium prospect	Zn Pb Cu U Ag Au Th
28	Hospital Bar placer	Au
29	Hospital Hot Spring	Geothermal
30	Woodtick group	Ag Au
31	Copper Mountain (Mary Kate) prospect	W Ag Cu Au
32	Big Chief claims	Au Pb Cu W Ag
33	Rock Rabbit prospect	Ag
34	Duches N. prospect	Au Ag
35	S.J. prospect	Cu Au
36	Slide prospect	Cu
37	Several Pits prospect	Pb Mo Cu Au
38	Snow Storm prospect	Pb Mo Au Cu Ag
39	Minnie Wilson No. 1 prospect	Cu Ag
40	Old Faithful group	W

	Prospect	No metals detected
160	Prospect	No metals detected
161	Prospect	Ag
162	Greyhound mine	Sn Pb Zn Cu Au Ag Bi Mo W
163	Prospect	Au Ag
164	General Grant prospect	Ag Pb
165	Prospect	No metals detected
166	Prospect	Ag
167	Shiney B No. 13	No metals detected
168	Opal Creek placer	Au
169	Bacon group	Zn Au Cu Pb Ag
170	Lead-Metals group	Ag Zn Cu Au Pb
171	Lemp group	Ag Au Zn Pb
172	Mountain King mine	Zn Pb Cu Au Mo Ag
173	Mahan prospect	Cu Zn Pb
174	Prospect	No metals detected
175	Badger lode	Au Ag Cu Pb
176	Old Timer prospect	Mn
177	Prospect	Zn Pb Ag
178	Prospect	Au Ag
179	16-to-1 prospect	Ag Zn Pb
180	16-to-1 patented claims	Pb Ag Zn
181	Old Soldier No. 1 prospect	Ag Au Pb
182	Old Soldier No. 2 prospect	Ag Au
183	Josephus Silver prospect	Ag Au
184	Josephus group (Float Creek mine)	Pb Zn Ag Au
185	Prospect	Au Ag Zn Pb
186	Colleen No. 10 prospect	Ag Au
187	Colleen group	Ag Cu Zn Pb Au
188	Clark Colleen prospect	Au Ag Pb Zn Cu
189	Silver Bell Extension prospect	Pb Ag Au
190	Silver Bell group	Pb Au Ag
191	Mountain Dew prospect	Ag Pb Au
192	Star mine	Ag Pb Zn Cu Au
193	Seafoam mine	Au Pb Zn Ag Cu
194	Prospect	Au Pb
195	Wildgoat No. 3 prospect	Zn Pb Ag
196	Prospect	Ag Zn Au Pb
197	Prospect	No metals detected
198	Enterprise mine	Zn Au Ag Pb
199	Seafoam placer	Au
200	Lovenest prospect	Ag Pb Zn
201	Prospect	No metals detected
202	Nessie No. 12 prospect	Au Ag Cu Pb Zn
203	Prospect	Pb Ag Au
204	Post mine (Lost Claim group)	Ag Zn Au Pb Sb
205	Prospect	Zn
206	Prospect	Zn Pb Ag
207	Wild Goat No. 1	Pb Ag
208	Prospect	Zn Pb Ag
209	Prospect	Zn Pb Ag
210	Prospect	Ag
211	MIA No. 22 prospect	Mo Cu Zn
212	Gold occurrence	Ag Au Zn
213	MIA No. 29 prospect	Au Ag
214	MIA No. 22 prospect	No metals detected
215	Betty Ruth prospect	Ag Cu Zn Pb Au
216	Wild Buck prospect	Ag Au Cu Zn Pb
217	Surprise prospect	Zn
218	Canary Yellow prospect	Pb Ag Zn Au Cu
219	Bonanza prospect	Zn Au Ag Pb
220	Long Shot prospect	Pb Ag Au Zn Cu
221	Longshot No. 3 prospect	Zn Au Ag Pb Cu
222	Longshot No. 3 prospect	Au Pb Zn Ag
223	MIA No. 30 prospect	Ag Pb Zn Au
224	Stella (Iron Blossom) prospect	Zn Pb Cu Ag Au
225	Prospect	No metals detected
226	Prospect	No metals detected
227	Kidney Lake prospect	No metals detected
228	Last Dollar prospect	Pb Zn
229	Pinyon Silver prospect	Zn Ag Au Pb
230	Williamson mine	Pb Ag Au Zn
231	Prospect	Au Pb Ag
232	Prospect	Pb Cu Ag Au Zn
233	Prospect	Cu
234	Prospect	Ag
235	Whiskey group	Au Ag
236	Prospect	Au Ag Pb Zn

Challis Ranger District

No.	Name	Commodity
237	Hot Creek lode occurrence	Au Ag Fluorspar
238	Geothermal occurrence	Geothermal
239	Lower Snowshoe Fluorspar occurrence	Fluorspar
240	Snowshoe Creek Fluorspar occurrence	Fluorspar
241	Shower Bath geothermal occurrence	Geothermal
242	Parker mine	Ag Au
243	Williams mine	Au Ag
244	Spider Creek prospect	SiO2
245	Last Chance prospect	Fe S
246	West Creek prospect	Pb Zn Cu
247	Mary Alice prospect	Pb Ag Cu Zn Fluorspar
248	New Hope prospect	Pb Zn Ag Au Cu Fluorspar
249	Florspar group prospect	Fluorspar
250	Challis View (Skyline #1) mine	Ag Pb Cu Zn
251	Kraken Hill (Chalspar) mine	Fluorspar
252	Skyline #8 mine (Daugherty group)	Pb Ag Cu Zn Au
253	Bluebird prospect	Pb Zn
254	Troxpar prospect	Fluorspar Zn Pb
255	Aztec (Double Sneeze) prospect	Pb Zn Ag Au Cu
256	Aztec #11 (Sneeze) prospect	Zn Cu Pb
257	JS prospect	Pb Zn
258	Keystone mine	Fluorspar Ag Pb Be Cu
259	G.C. Silver prospect	Pb Zn Ag

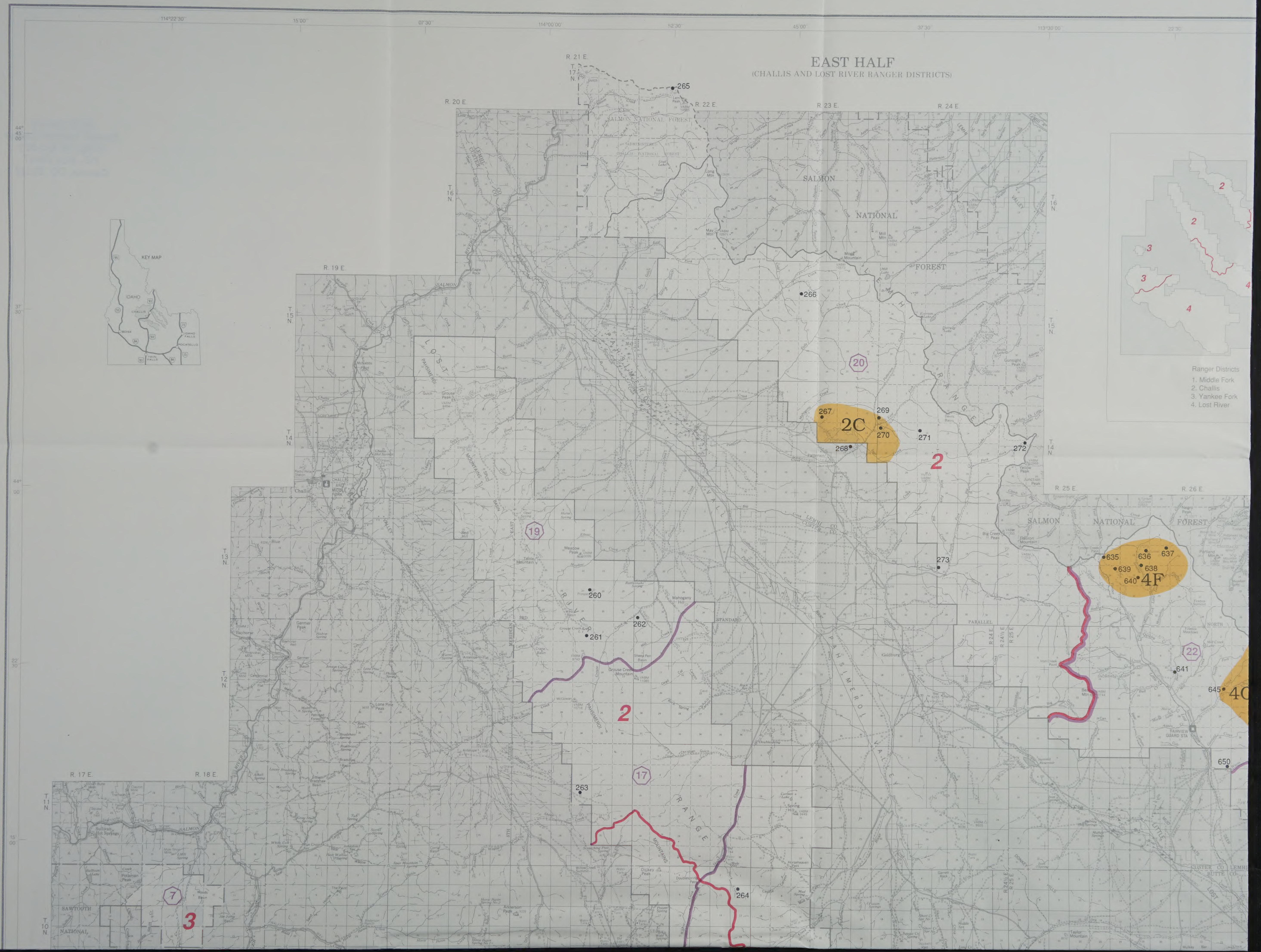
(Nos. 260 through 273 are on Plate 2)

Yankee Fork Ranger District

No.	Name	Commodity
274	Zeolite occurrence	Zeolites
275	Tip group	Au Ag Mo
276	Zeolite occurrence	Zeolites
277	Zeolite occurrence	Zeolites
278	Zeolite occurrence	Zeolites
279	Massacre Mercury prospect	Hg Zn Cu
280	Loon Creek Hot Springs	Geothermal
281	Lucky Star prospect	Au Ag Cu
282	Billy Goat (Ridge Runner) prospect	Au Ag Cu
283	Prospect	Au

403	Prospect	Cu
404	Princess & Perry's Pkg.	Au
405	Charlotte Gay placer	Au
406	Ramey Creek group (Only Chance)	Au
407	Gold Star 1-4	Au
408	Little Nugget No. 1	Au
409	Sunrise	Au Ag
410	Lucky Shelly Kay	Au Ag
411	Sunset mine	Au Ag
412	Rankin Creek mine	Au Ag
413	Lucky Shelly	Au
414	Ace in the Hole	Au Ag
415	Rose group	Au Ag
416	Ramey Creek project	Mo Cu
417	Bachelor Mountain mine	Zn Au Cu Pb Ag
418	Yankee Fork Mill	Au
419	Yankee Fork placer	Au Ag
420	Hygrade 1-3 & Windfall 1-4	Au
421	Sandy J group	Au
422	Gold Lode 6-10 & Jesse Cloud placer	Au
423	Helen's placer	Au
424	Red Rock ("Unknown")	Au
425	Gold Lode 1-5	Au
426	Fairplay mine	Au Ag
427	George Washington (Morrison) mine	Au Cu Ag
428	Passover (Last Chance) mine	Au Ag
429	Holiday	Au
430	Runover mine	Au Ag
431	Bonanza occurrence	Cu Pb
432	Julietta mine	Au Ag
433	Buckshot No. 1	Au
434	Letha mine	Au Ag
435	Charles Dickens mine	Cu Au Ag Pb Zn
436	Trapper	Au
437	Honey Girl	Au
438	Dubuque mine	Au Hg Ag Cu
439	Longview mine	Sb As Au Ag Zn
440	Idaho	As Au Ag Cu Sb
441	General Custer mine	Cu As Au Sb Ag Pb
442	Mullan	Au Ag
443	Vishneu	Au Ag
444	Combination	Au Ag
445	South Sunbeam	Au Ag
446	Enterprise group	Au Ag Cu Pb
447	McClure	Au Ag As Sb W
448	Continental	Cu Sb Au Ag Zn Pb
449	Badger mine	Pb Cu Au Ag Zn
450	Lucky Boy mine	Pb Sb Au Ag Cu
451	Yellow Bird	Au Ag
452	Black mine	Au Ag
453	Fourth of July mine	Zn Sb Au Ag Cu Pb
454	Wire Silver	Sb Au Ag
455	King Solomon 1-4	Au
456	High Hopes	Au
457	Shoestring (Crazy Lumberjack)	Au
458	Olga Marie (Moonbeam)	Au
459	New Deal & Square Deal	Au
460	Tammco group	Au
461	Silver Pine & Soapstone	Au
462	Prospect	Au
463	Nugget group	Au
464	Payoff group	Au
465	Montana Gulch placer	Au
466	Jordan Creek placer	Au Ag
467	Halloween (Kwajalein) mine	Au Cu Pb Zn Ag
468	Sunbeam (Golden Sunbeam) mine	Au Ag
469	Whale	Au Ag
470	Jesse James mine	Au Ag
471	Thunderbolt	Cu Pb Ag Au
472	Gold Star	Au Ag
473	Why Not mine	Au Ag Pb Cu
474	Montana mine	Zn Cu Au Ag Pb
475	Arcade mine	Ag Au Cu Pb
476	McFadden mine	Sb Pb Au Ag Cu
477	Charles Wain	Au Ag
478	Snowdrift mine	Au Pb Cu Ag
479	Golden Gate mine	Pb Cu Au Ag
480	Tonto mine	Au Ag Pb Cu
481	Mountain Chief	Au Ag
482	Gold prospect	Au Ag
483	Silver and Gold prospect	Ag Au
484	Silver and Gold prospect	Ag Au
485	Prospect	Au Ag
486	Silver prospect	Ag
487	Silver and gold prospect	Ag Au
488	Silver and gold prospect	Ag Au
489	Gold prospect	Ag Au
490	Fluorspar occurrence	Fluorspar
491	H U H Bros.	Au
492	Wangler group	Au Ag Fluorspar
493	Lamb prospect	Fluorspar Be
494	Silver prospect	Ag
495	Spotted Bear group	Cu Graphite Au Ag
496	Poacher group	Au Ag Cu
497	Laka placer	Au
498	Pepe Pappy & Grandpas Follie	Au
499	Thompson Creek Tungsten mine	W
500	Buckskin	W Zn Ag
501	Rain in the Face	Mo
502	Thompson Creek Molybdenum mine	Mo Ag Au Cu Pb
503	Berbes	Au
504	Sure Shot mine	Au Ag Zn Pb Cu
505	Bruno mine	Pb Au Ag
506	Flagstone 1-7 mine	Stone
507	Cash Creek prospect	Pb Cu Zn Ag Au
508	Prospect	Au
509	Maude and Vermont Lodes	Pb Zn Cu Ag
510	Silver Bell mine	Ag Pb Au Cu Zn
511	Last Chance (Big Pine) mine	Au Cu Pb Zn Ag
512	Juliet Lode	Zn Pb Cu Au Ag
513	Arizona prospect	Zn
514	Virginia Dare prospect	Pb Cu Ag Zn Au
515	Skylark mine	Cu Ag Pb Zn Au
516	Ramshorn mine	Ag Cu Zn Pb Au
517	Barton mine	Pb Ag Zn Cu
518	Toolie	Pb Zn
519	Cave mine	Pb Ag Cu Au Zn
520	Keno mine	Pb Ag Au Cu Zn
521	Forest Rose mine	Au Ag Pb Cu Zn
522	Pacific mine	Fluorspar Ag Pb Au Cu Zn

			U
			U
			Au Ag U
		Creek placer	Au Pb Ag
		Big Hank	U
	396	Peach Creek prospects	Cu Pb Zn
	397	Elkhorn placer	Au
	398	Molly Hogan 1-22 group	W Mo
Ag	399	Annabel Lee group	Cu
Pb	400	Billy John 1-2	W
No metals detected	401	Little Leslie 1-4 (Hygrade)	Pb Mo Au Ag
No metals detected	402	R & R	Au



EAST HALF

(CHALLIS AND LOST RIVER RANGER DISTRICTS)

114°22'30"
15'00"
07'30"
114°00'00"
52'30"
45'00"
37'30"
113°30'00"
22'30"
KEY MAP
IDAHO
CHALLIS
SALMON NATIONAL FOREST
LEMHI
PAHSIMEROI
LOST RIVER RANGE
SALMON
Challis
R. 17 E.
R. 18 E.
R. 19 E.
R. 20 E.
R. 21 E.
R. 22 E.
R. 23 E.
R. 24 E.
R. 25 E.
R. 26 E.
T. 10 N.
T. 11 N.
T. 12 N.
T. 13 N.
T. 14 N.
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T. 17 N.
SAWTOOTH NATIONAL
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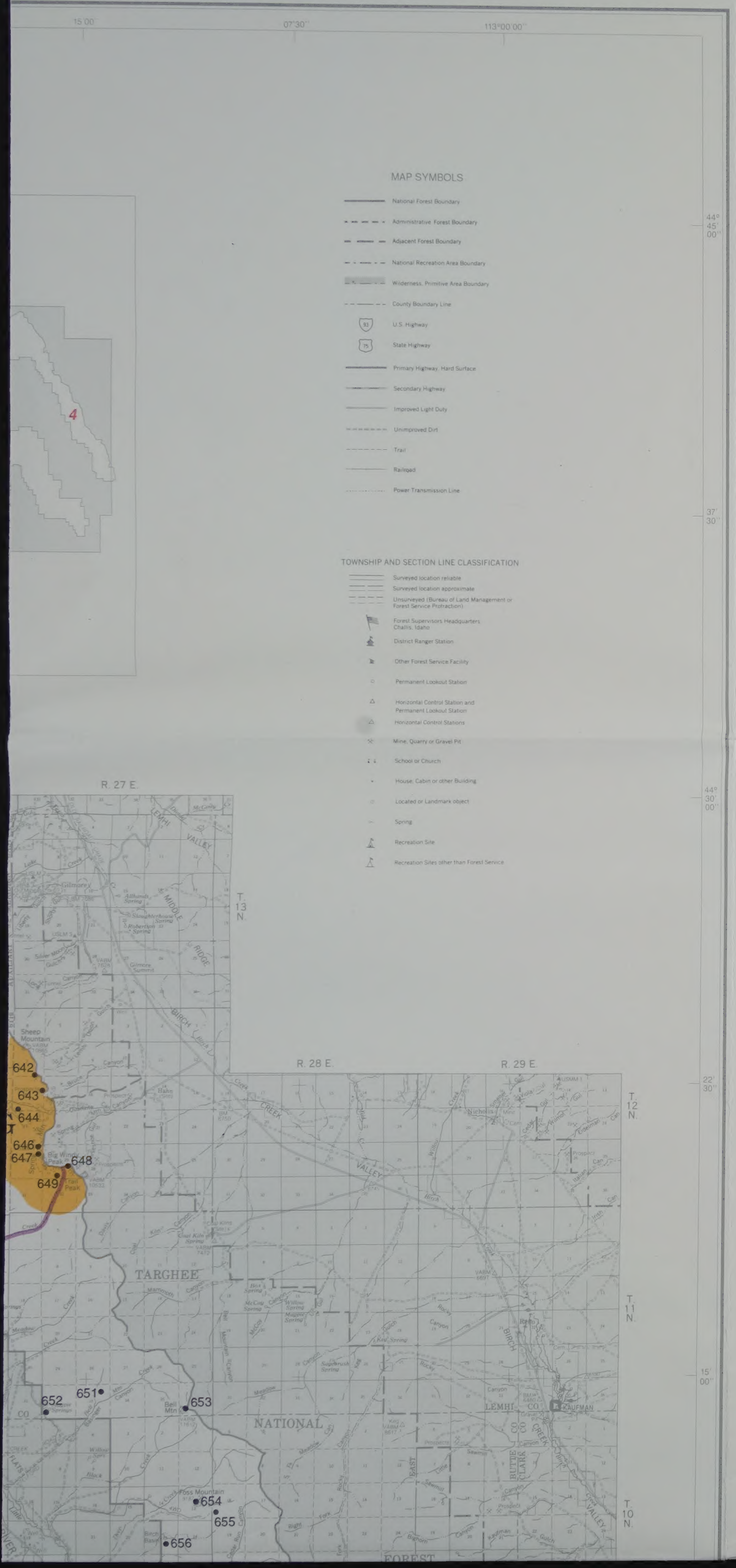
Ranger Districts
1. Middle Fork
2. Challis
3. Yankee Fork
4. Lost River


15'00"
07'30"
113°00'00"
44° 45' 00"
37' 30"
44° 30' 00"
22' 30"
15' 00"
4
MAP SYMBOLS
National Forest Boundary
Administrative Forest Boundary
Adjacent Forest Boundary
National Recreation Area Boundary
Wilderness, Primitive Area Boundary
County Boundary Line
93
U.S. Highway
75
State Highway
Primary Highway, Hard Surface
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Railroad
Power Transmission Line
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed location reliable
Surveyed location approximate
Unsurveyed (Bureau of Land Management or Forest Service Protraction)
Forest Supervisors Headquarters Challis, Idaho
District Ranger Station
Other Forest Service Facility
Permanent Lookout Station
Horizontal Control Station and Permanent Lookout Station
Horizontal Control Stations
Mine, Quarry or Gravel Pit
School or Church
House, Cabin or other Building
Located or Landmark object
Spring
Recreation Site
Recreation Sites other than Forest Service
R. 27 E.
R. 28 E.
R. 29 E.
T. 13 N.
T. 12 N.
T. 11 N.
T. 10 N.
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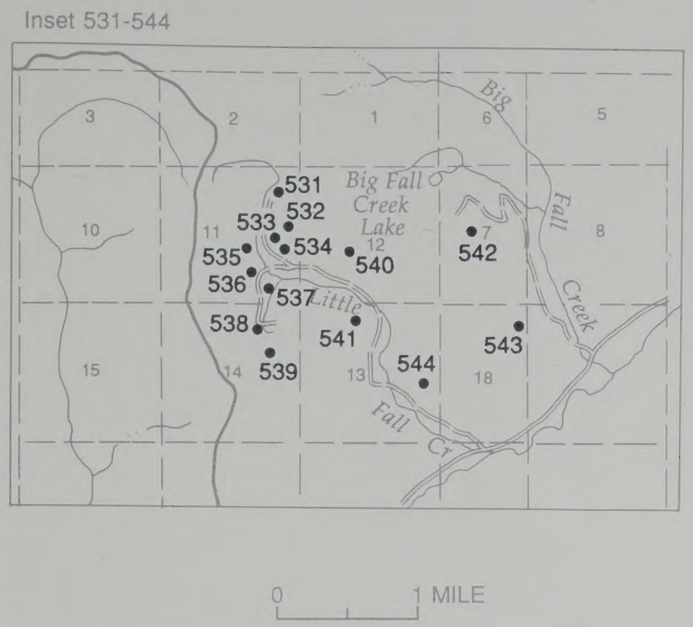
FOREST


Inset 531-544
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Big Fall Creek Lake
Big
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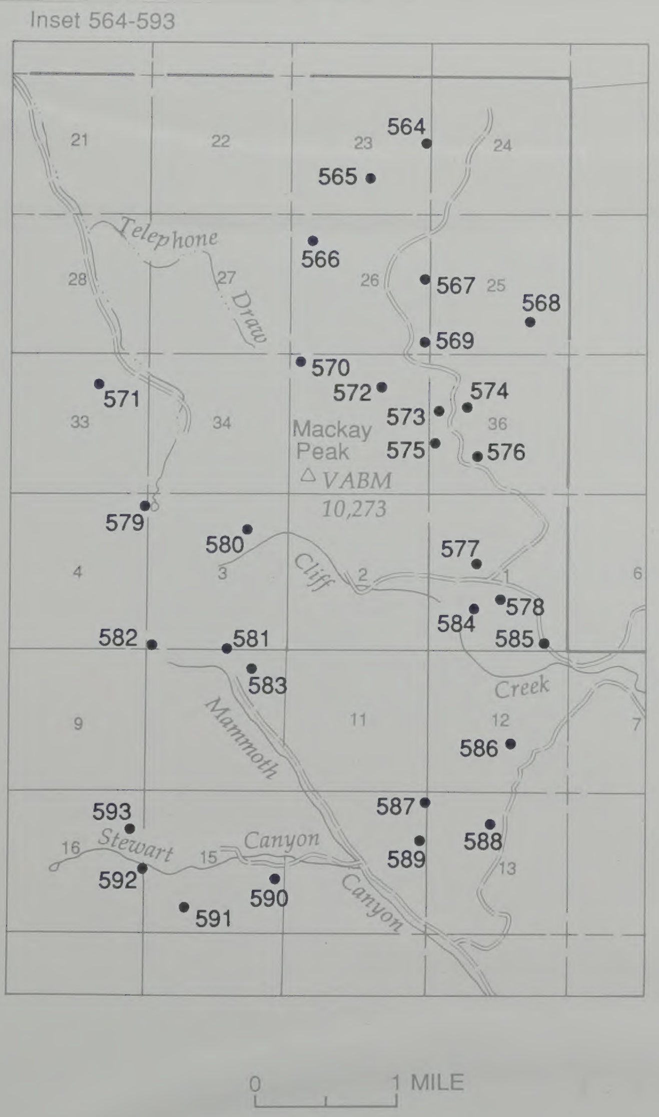
Inset 564-593
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Mackay Peak
VABM 10,273
Cliff
Creek
Mammoth
Stewart
Canyon
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OPEN FILE REPORT
PLATE 2

MINES, PROSPECTS, AND AREAS OF DEVELOPMENT INTEREST IN THE CHALLIS NATIONAL FOREST, IDAHO, EAST HALF

MAP PRODUCED AND PUBLISHED BY
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

LEGEND

2

Ranger District Boundary

19

U.S. Forest Service Management Areas[1]

No.	Name
1	Frank Church-River of No Return Wilderness
2	Seafoam
3	Marsh Creek
4	Valley Creek
5	Basin Creek
6	Yankee Fork
7	East Fork
8	Thompson Creek
9	Squaw Creek
10	Bayhorse
11	Pioneer Mountains
12	Arco Hills
13	Garden Creek
14	South Lemhi
15	South Lost River
16	Borah Peak
17	Pahsimeroi Mountains
18	Mackay Front
19	North Pahsimeroi
20	North Lemhi
21	Challis Creek
22	Sawmill Canyon
23	Furnace Creek
24	Wilderness Corridors
25	Antelope Creek

[1] From Land Resource Management Plan for the Challis National Forest, 1987

2C

Areas of Development Interest

2C Blue Wing Mining District
Veins and stockworks in intrusive rocks and quartzite
(tungsten, silver, copper, lead, zinc, gold, molybdenum)

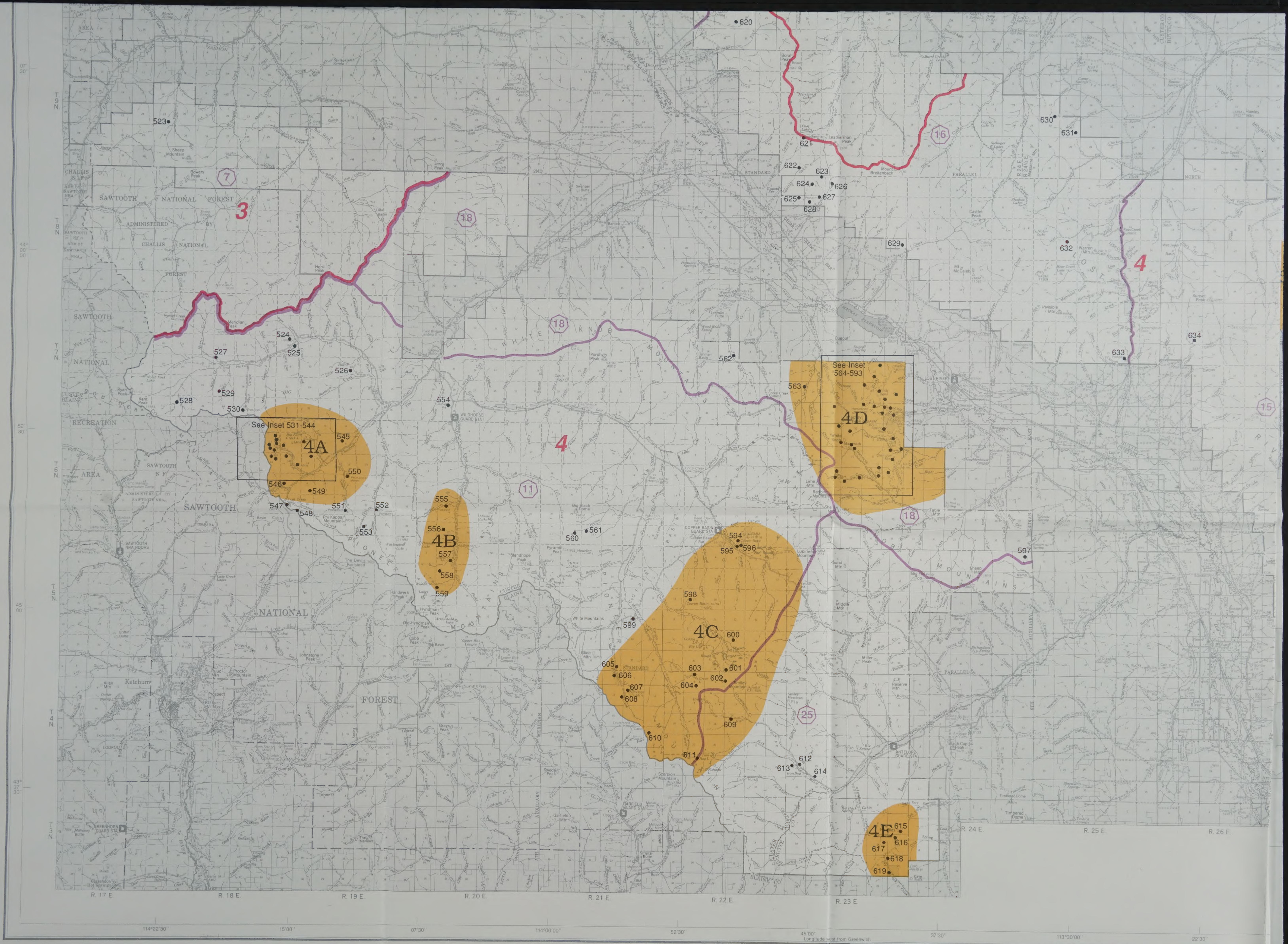
4A Alta mining district
Stratabound syngenetic sulfide deposits
(silver, lead, zinc, gold, copper)

Polymetallic veins in black shale and carbonate rocks
(lead, silver, zinc, copper, tungsten)

Stockworks in Tertiary igneous intrusive rocks
(molybdenum)

4B Wldhorse Creek area
Polymetallic skarns

555	Prospect	Pb Zn
556	Pine Mouse group	W
557	Wildhorse	W Be
558	Topsey group	W Ag Pb Zn Au
559	Sir Rocko 1-2	Mo
560	Prospect	Ag Au
561	Ajax group	Ag Pb
562	Prospect	Ag Au
563	Navarre Creek	Ag Sb Au Gypsum
564	Prospect	Ag
565	Silver Gem	Ag Pb
566	Doughboy mine (Veteran)	Ag Au Cu Pb Zn
567	Kenneth Wayne	Ag Au Pb Zn Cu
568	MK claims	Ag Pb
569	Silver King group	Ag Pb
570	Black Daisy (Kennedy) group	Pb Ag Cu Au Zn
571	Prospect	W Ag Pb
572	Horseshoe mine	Zn Ag Pb Cu Au W
573	White Knob mine	Pb Ag Zn Cu Au
574	Blue Bird (Easlie) mine	Pb Ag Au Cu Zn
575	Tiger group	Cu Au Ag
576	Empire mine	Cu Ag Au Pb Zn W
577	Saddle (Ausich-Barton)	Fe Cu
578	Grand Prize	Pb Ag W Cu Au
579	Copper Queen mine	W Cu
580	Silver and Lead Bell (Hanni)	W Ag Pb Cu Zn
581	Phoenix mine	W Cu Mo
582	Mammoth (Mildred) mine	Cu Pb Ag
583	Red Sky	Ag Pb
584	One and Only One prospect	W Mo Ag Fe
585	Vaught	W Mo
586	Champion mine	Pb Zn Ag Cu Au
587	Harry Aune prospect	Cu
588	Puzzler prospect	Pb Zn
589	Joan	Cu W
590	Royal Ruby Silver	Ag
591	George Washington 1-4	Ag Pb Zn
592	Prospect	Ag
593	Prospect	Ag
594	Copper Basin mine	Cu Ag Au Pb
595	Anderson prospect	Cu Ag Au
596	Rosenkranze mine	Cu
597	Prospect	Au
598	Prospect	Pb Ag Zn
599	Gravel pit	Sand and gravel
600	Upper Lake Creek	Au Ag Zn Cu Pb
601	Prospect	Au
602	Prospect	Ag
603	Cornhusker prospect	Pb Zn Cu
604	Candy Cane group	Cu Pb Zn
605	Gamebet group	Ag Cu
606	Mackinaw group	Ag Cu Pb Zn
607	Star Hope mine	Pb Ag
608	Bent Pine Tree group	Ag Pb Zn
609	Silver Bell	Ag Pb Zn
610	Snowball group	Pb Ag
611	Prospect	Ag
612	Prospect	Ag
613	Prospect	Ag
614	Prospect	Ag
615	Lead Belt (Big Dipper) mine	Ag Pb Au Cu
616	Butte-Antelope (Lowboy) mine	Ag Pb Zn Au Cu
617	Silver Haze	Ag Pb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See Inset 531-544
See Inset 564-593
SAWTOOTH NATIONAL FOREST
ADMINISTERED BY
CHALLIS NATIONAL FOREST
SAWTOOTH NATIONAL RECREATION AREA
SAWTOOTH NATIONAL FOREST
WHITE KNOB MOUNTAINS
PIONEER MOUNTAINS
Ketchum
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114°22'30"
15'00"
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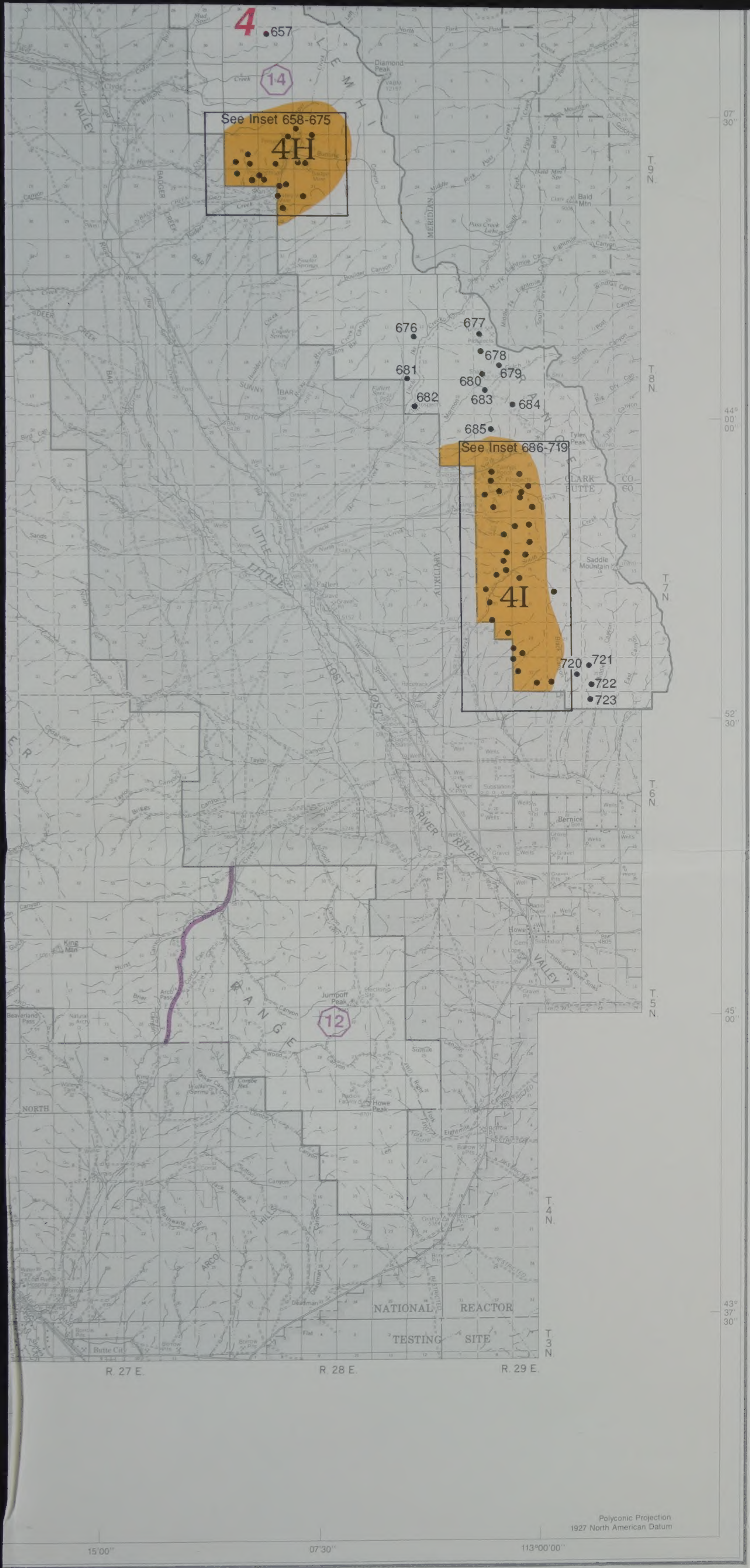
114°00'00"
52'30"
45'00"
37'30"
113°30'00"
22'30"
Longitude west from Greenwich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See Inset 658-675
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See Inset 686-719
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T 6 N
T 5 N
T 4 N
T 3 N
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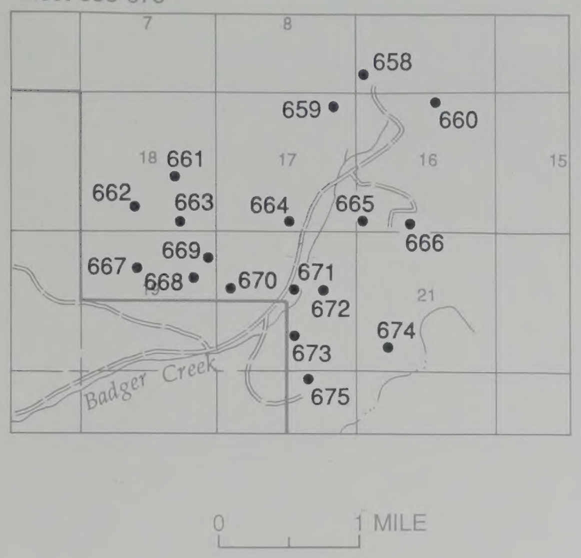
RIVER
VALLEY
RANGE
NATIONAL
REACTOR
TESTING
SITE
R 27 E.
R 28 E.
R 29 E.
Polyconic Projection
1927 North American Datum

Inset 658-675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Badger Creek
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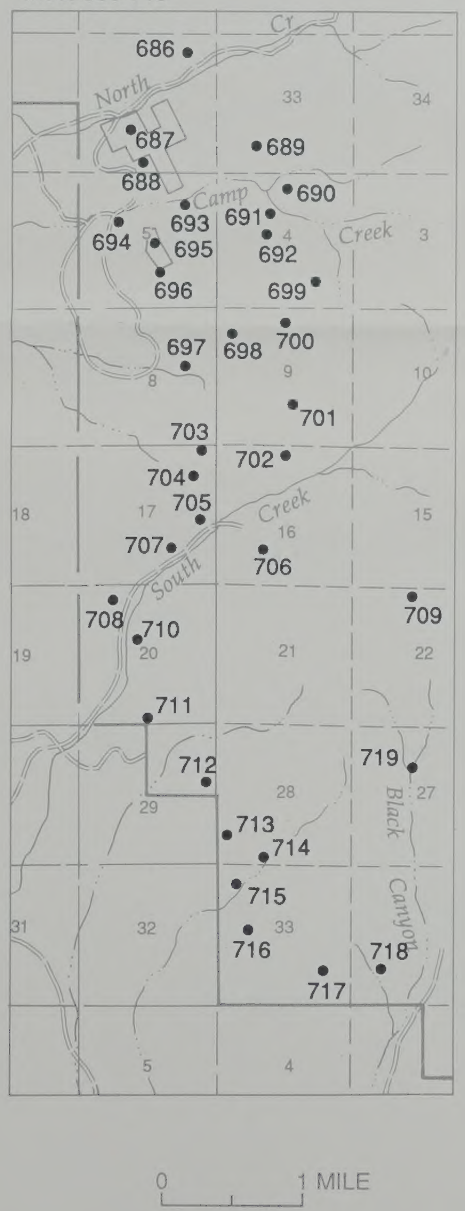
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Canyon
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4C Copper Basin
Polymetallic skarns
(copper, lead, zinc, silver, gold)

Polymetallic veins in black shale
(lead, silver, copper, gold)

4D Alder Creek mining district
Polymetallic skarns and veins
(copper, zinc, lead, silver, tungsten, gold, iron)

Veins in volcanic rocks
(antimony, gold)

4E Lead Belt Creek area
Polymetallic veins in black shale and limestone
(silver, lead, zinc, copper, gold)

Irregular replacements in limestone
(silver, lead, zinc)

4F Sawmill Creek area
Precious metal veins in quartzite
(gold, silver, copper)

Polymetallic veins in dolomite
(lead, silver, zinc, barite)

4G Windy Peak area
Polymetallic veins and irregular replacements
in dolomite
(silver, lead, zinc, copper, iron)

4H Badger Creek area
Polymetallic veins in dolomite and quartzite
(lead, silver, copper, gold)

4I Dome mining district
Polymetallic veins in quartzite and dolomite
(silver, lead, zinc, copper)

•240

Mines and Prospects

Challis Ranger District

No.	Name	Commodity
260	Benchmark prospect	Pb
261	Grouse Creek Lake prospect	Zn
262	Mahogany Hill prospect	Zn
263	Hilltop occurrence	Pb Ag Ba Au
264	Big Dike prospect	Calcite
265	H&R (Rocky Mountain Goat) mine	Cu Au Th
266	Prospect	Fe
267	Miller mine	W
268	Ima mine	W Ag Cu Pb Zn Mo Au
269	Silver group	Ag Pb Au Cu
270	Prospect	W
271	Prospect	Cu Sb
272	Yellow Peak prospect	Ag
273	Big Creek & Wells Cobalt prospects	Co Ni Au Ag Cu

Yankee Fork Ranger District

No.	Name	Commodity
523	Sheep Mountain	Au Ag

Lost River Ranger District

No.	Name	Commodity
524	Sweets Park Canyon (Urexco)	Be U
525	Old Cabin 1-3	U
526	Bartlett Creek prospect	U V
527	Bluebird	Au
528	Prospect	Au
529	Bear Creek prospect	Pb Zn Ag
530	Prospect	Au Ag Cu Pb
531	Long Trail mine	Pb Zn Ag
532	Prospect	Ag
533	Lucky Strike prospect	Pb Ag Zn
534	Prospect	Ag Pb Zn
535	Alto Silver-Quartz group	Pb Zn Ag
536	Prospect	Ag Pb Cu
537	Prospect	Pb Zn Ag
538	Alto Silver group	Ag Zn Pb Cu
539	Star 1	Pb Zn Ag Cu
540	Purple Spar prospect	Fluorspar
541	Anda (Walton Moly) group	Mo
542	Black Rock mine	Pb Ag Zn Cu
543	Giant Quartz 1 (Big Falls Creek)	Quartz crystal W Ag Au
544	White Elephant (Dewey) group	W Au Ag
545	Prospect	Ag
546	Basin Group prospect	Pb Zn Cu
547	Sum	Ag Pb Zn
548	Prospect	Ag
549	Big Joe-Lost Summer (White Mtn) grp	Mo
550	Phi Kappa mine	Ag Zn Pb Cu Cd Au
551	Silver Dew	Pb Zn Ag
552	Quanta (Lodgepole) group	Ag Zn Cu
553	Prospect	Au
554	Gravel pit	Sand and gravel

618	Bonanza	Ag
619	Prospect	Ag Pb
620	Mt. Borah (Ben Lyon) prospect	Pb
621	Jayrock	Ag
622	Snowshoe	Barite
623	Prospect	Ba Ag Pb
624	Prospect	Au Ag Barite
625	Prospect	Ag Cu Barite
626	Prospect	No data
627	Prichett	Ag Pb Zn
628	Prospect	Ag
629	Upper Cedar Creek	Au Ag
630	Massacre Mtn	Ag
631	Orion	Gemstone
632	Kranovich	Ag
633	Pass Creek	Ag
634	Elbow Quartz	SiO2
635	Prospect	Ag
636	Roosevelt	Ag
637	Trey	Au Ag
638	Pay Day group	Barite Ag Au
639	Oregon group	Pb Ag
640	Lady May	Au Ag Cu
641	Wanda Loy	Pb Ag Zn Au
642	Lemhi Range	Limestone
643	Sims Magnetite (Bruce)	Au Ag Cu
644	Little Windy (Silverside) group	Ag Pb Zn
645	Bear Hat	Au
646	Teddy (Medicine)	Pb Ag Au Cu
647	Elizabeth (Sand Carbonate)	Pb Ag Au Cu
648	Red Warrior (Sunrise)	Pb Ag Au Cu Zn
649	Dividend (Big Smoky) mine	Zn Pb Zn Cu Ag
650	Warm Creek prospect	Cu
651	Copper Bluff (Bornite, Bell Mtn.)	Cu Pb Ag Au
652	Magpie Springs prospect	Cu
653	Copper Bell	Pb Zn
654	Bell View mine	Fe Mn
655	Iron Cap	Fe
656	Log Chain	Fe
657	Williams Creek prospect	Pb Zn Ag
658	Automatic mine	Cu Pb Zn Ag
659	Lucky Strike	Fe Pb Zn
660	Jersey Belle (Merrill)	Pb Zn Cu
661	Hope	Pb Ag
662	Westside	Pb Ag Cu Zn Au
663	Badger King mine	Pb Ag Zn Cu
664	Cleopatra	Ag Pb Zn
665	Triumph	Cu Ag Pb
666	Badger mine	Pb Ag Cu Au
667	Rainbow	Pb Zn
668	Bar 2	Pb Cu Ag
669	Nipper	Pb Zn
670	Bar No. 7	Pb Cu
671	Badger Creek borrow site	Stone
672	Cedar Post	Pb Zn Cu
673	Last Chance	Zn Ag Pb
674	Red Bird	Pb Cu
675	Valley View mine	Pb Ag
676	Uncle Ike Creek prospect	Zn Pb Ag
677	Copper Mountain mine	Cu Ag Pb
678	Copper Mountain No. 8	Pb Ag Zn Cu
679	Whitebird (Mormon Gulch) mine	Barite Pb Ag Zn
680	Bighorn (Mormon Gulch 1-3) mine	Barite Pb Ag Au
681	Fallert Springs prospect	Ag Cu Zn
682	Ul No. 6 and 7	Cu Ag Au
683	Windfall (AU No. 27)	Pb Zn
684	Sparrow	Zn Pb
685	Johnson prospect (B & N group)	Pb Zn Cu
686	Sentinel mine (North Creek No.1)	Pb Zn Ag Cu
687	Wilbert mine	Pb Ag Cu Zn Au
688	Ore House No. 7-8	Zn Pb Ag
689	Nellie Boyd	Zn Pb
690	Waymire	Fe Zn
691	Camp Creek No. 4	Pb Zn
692	Camp Creek No. 1	Pb
693	Camp Creek No. 3	Cu Pb Zn
694	Red Ledge No. 3	Cu
695	Lookout mine	Pb Ag Zn
696	La Riviere Perdu No. 6 & 7	Zn Ag Pb
697	Great Western mine	Ag Pb Cu
698	May Queen	Pb Zn Au
699	Camp Creek No. 2	Pb
700	Ore House No. 32b	Zn Cu Pb
701	Rubie	Cu Pb Zn Ag
702	Pearl	Cu Pb
703	La Riviere Perdu No. 28	Pb Ag
704	South Creek No. 4	Ag Pb Cu Zn
705	South Creek No. 10	Pb
706	Ajax mine (Pickup, South Creek 20)	Pb Ag Cu Au
707	South Creek No. 16	Cu Ag
708	South Creek No. 24	Cu
709	San Francisco prospect	Cu Ag Pb
710	South Creek No. 36	Pb Ag
711	South Creek No. 61	Pb Ag Zn
712	South Creek No. 78	Cu Zn
713	North Star (South Creek No. 107)	Cu
714	South Creek No. 121	Zn Cu Ag Pb
715	South Creek No. 119	Pb Ag Cu
716	South Creek No. 147	Pb Zn Cu
717	Black Back	Pb Ag Zn
718	White Rock	Pb
719	Protection (BC No. 23-24)	Pb Ag Zn
720	BC No. 51	Zn Pb
721	BC No. 53 Extension	Zn Pb
722	BC No. 53	Ag Pb Zn
723	BC No. 65	Pb Zn

		Zn
		Pb Ag
		Ag Pb Zn
		Ag Pb Zn
	ball group	Pb Ag
	Prospect	Ag
612	Prospect	Ag
613	Prospect	Ag
614	Prospect	Ag
615	Lead Belt (Big Dipper) mine	Ag Pb Au Cu
616	Butte-Antelope (Lowboy) mine	Ag Pb Zn Au Cu
617	Silver Haze	Ag Pb

Ag	399	Annabel Lee group	Cu
Pb	400	Billy John 1-2	W
No metals detected	401	Little Leslie 1-4 (Hygrade)	Pb Mo Au Ag
No metals detected	402	R & R	Au